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The movements of Oystercatchers *Haematopus ostralegus* L. visiting or breeding in the British Isles

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ABSTRACT

THIS study forms part of a programme of research into problems of reducing losses among stocks of the edible lamellibranchs *Cardium edule* and *Mytilus edulis* due to predation by large migrant and winter flocks of Oystercatchers. The movements of birds frequenting major shellfish-producing areas in Wales and north-west England were investigated over five years by ringing and colour-banding, and the results analysed in conjunction with pullus and other recoveries data already available from European ringing schemes. A complex migration pattern in the area of the British Isles is indicated. The British coasts, and especially those around the Irish Sea, form the main wintering zone of the large 'Atlantic populations' breeding in Iceland, the Faeroe Islands and the British Isles. The 'Continental populations'—chiefly those breeding in the Baltic region and Low Countries—winter almost exclusively along the European seaboard from the Heligoland Bight to south-western Iberia. Comparatively few Continental birds visit the British Isles, and those come predominantly from Norway. The autumnal influx of northern birds into the British Isles begins in late July and coincides with a predominant south to south-westerly post-breeding shift, largely within these islands, of Scottish and many other native breeders. Few adult British Oystercatchers emigrate, whereas many first-autumn youngsters depart to western France and Iberia. Immatures remain in the wintering areas until three or four years old, when they generally return to the vicinity of the birth-place to breed. Adults often home to the same territory, and hence re-mate with the same partner, for a number of years. Evidence from ringing and colour-banding suggests that, at least in the five areas studied, many adults likewise tend to home each autumn to, and then remain within, specific wintering places. The existence in other waders of homing and site attachment behaviour in winter is discussed, and it is suggested that fidelity to a particular winter quarters may be normal in the Oystercatcher when prey distribution and abundance are more or less stable.

The movements of Oystercatchers *Haematopus ostralegus* L. visiting and breeding in the British Isles

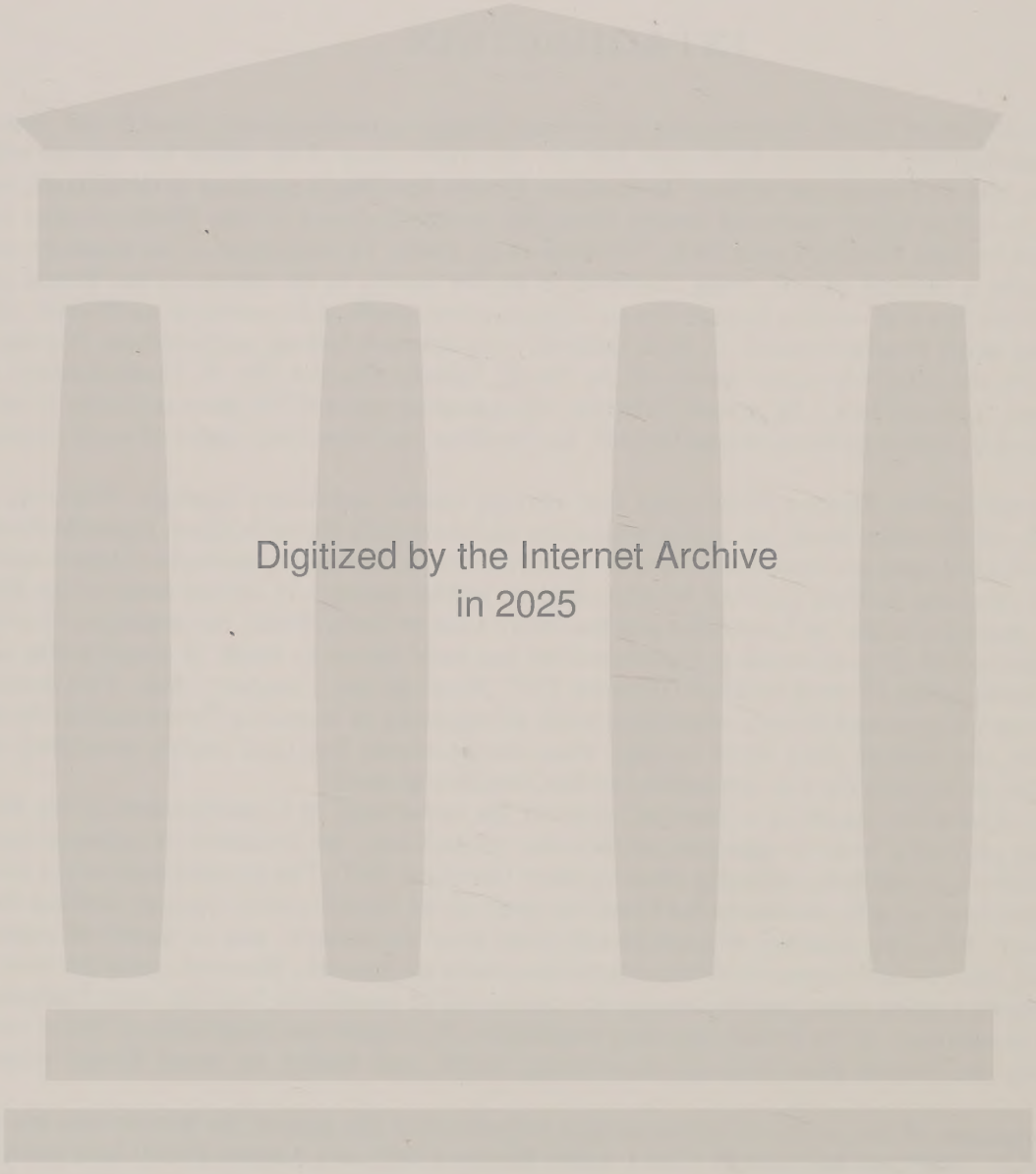
INTRODUCTION

THE breeding distribution of the Oystercatcher in northern Europe is predominantly coastal and virtually continuous from northern Russia to north-west France; it includes most of the Baltic Sea area as well as the British Isles, Faeroe Islands and Iceland. In southern Europe breeding is confined to the Atlantic coast of Iberia and to a few widely scattered haunts along the northern shores of the Mediterranean from southern France to Asia Minor (Voous 1960, Witherby *et al.* 1940). To most parts of its northern range the species is only a summer visitor, being restricted in winter mainly to the shores of the British Isles, the southern North Sea and western France. Some Oystercatchers reach as far south as north-west Africa in winter, whilst small numbers remain in high latitudes in south-west Iceland and southern Norway on coasts washed by the relatively warm waters of the North Atlantic Current (Dr. F. Gudmundsson and Dr. H. Holgersen, pers. comms.). In general, however, the wintering areas of the more northerly breeding populations overlap, and sometimes extend beyond, the breeding and wintering ranges of more southerly populations.

Breeding Oystercatchers disperse territorially over various coastal and inland habitats. Wintering and migrating birds, on the other hand, are highly gregarious and essentially shore-dwellers, typically forming large flocks on coastal sand and mud-flats where they feed chiefly on the bivalve molluscs *Cardium edule* L. (edible cockle), *Macoma balthica* (L.) and *Mytilus edulis* L. (edible mussel). In certain areas of the British Isles, notably Morecambe Bay in Lancashire and the Burry Inlet in south Wales, the predation of cockles by large concentrations of non-breeding Oystercatchers has been shown to result in considerable losses among marketable stocks of these shellfish (Drinnan 1957, Hancock and Urquhart 1965). This predation is heaviest between August and March, when large flocks of migrating or wintering Oystercatchers frequent the cockle beds, and lightest from April to July, when comparatively few (and mainly immature) birds remain after the spring departure of the adults to their breeding grounds.

This paper presents the results of a five-year study of the movements of Oystercatchers in the British Isles and forms part of a wider programme of fisheries research into the problems of reducing Oystercatcher depredations in shellfish-producing areas (see also Davidson 1967). The primary aims of the investigations described here were to determine the breeding areas of the Oystercatchers causing shellfish losses, to elucidate both their long-distance migrations and more local movements, and to assess the extent to which wintering flocks might remain faithful to particular wintering grounds. However, since this work has necessarily covered a much wider field of enquiry the results will be considered from the more fundamental aspects of: (i) movements of the British breeding population, (ii) origins and migrations of those Oystercatchers visiting the British Isles, and (iii) movements within, and fidelity to, some British wintering grounds.

General summaries of the pattern of Oystercatcher migrations in the area of the British Isles are given in Witherby *et al.* (1940) and Bannerman (1961), whilst Buxton (1957) and Andrew (1959) have previously analysed the recoveries of British Oystercatchers, ringed mainly as chicks, and recoveries within the British Isles of foreign-ringed birds.



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SECTION I
METHODS AND MATERIALS

To obtain adequate data from such a short-term study as this a special project for marking large numbers of Oystercatchers, both by ringing and colour-banding, was started in July 1962 by the Fisheries Department of the Ministry of Agriculture, Fisheries and Food. This project will be referred to as the M.A.F.F. project.

Prior to 1962 the vast majority of British-ringed Oystercatchers had been caught as chicks (pulli). Recoveries data from such birds have slowly accrued over several decades and now provide useful information on the dispersal of juveniles from their birth-places and also, to a lesser extent, some indication of their survival and eventual breeding areas. The M.A.F.F. project, on the other hand, was directed primarily towards marking the already full-grown, and in most cases adult, Oystercatchers which visit or winter in cockle-producing areas. For comparison, some birds were also marked in other winter haunts. In addition, limited marking of a few breeding populations was undertaken in an attempt to compare the dispersal patterns of post-breeding adults and their offspring, and to investigate the annual return of adults to their nesting areas. Use has also been made of the scattered notes in the literature referring to visible (diurnal) or audible (nocturnal) migration of Oystercatchers in the British Isles.

All trapping and marking of migrant and wintering Oystercatchers was concentrated in five study areas: *Morecambe Bay*, Lancashire; *Dee Estuary* and *Conway Bay*, North Wales; *Burry Inlet*, South Wales; *Exe Estuary*, South Devon. These areas are close to the centre of Oystercatcher wintering distribution in the British Isles (Dare 1966) and are scattered in a more or less north–south orientation up and down the coasts of north-west England, Wales and south-west England, some 250 miles directly separating the most northerly and southerly places. Plans to extend the project to other coasts, and to The Wash in East Anglia in particular, could not be realized in the time available.

In all, 5 383 Oystercatchers were ringed in the above localities between September 1962 and December 1964. Of these, 3 936 were also colour-marked with plastic leg bands. Individual area totals, colour codes and other details are given in Appendix I. The work in the two major cockle-producing areas of *Burry Inlet* and *Morecambe Bay*, and in *Conway Bay*, was carried out by the writer and his colleagues, P. E. Davidson and A. J. Mercer, assisted by Fishery Officers of the Lancashire and Western Sea Fisheries Joint Committee and the South Wales Sea Fisheries Committee. In the *Dee Estuary* the programme of research was undertaken on behalf of the Ministry by Dr. E. White and Mr. J. C. Gittins, who will be describing their results in full elsewhere. In the *Exe Estuary* some of the work was done in conjunction with the wader-ringing project of a local ornithologist, Mr. D. B. Cabot.

Adult breeding Oystercatchers were trapped mainly on the islands of Anglesey and Skomer (Pembrokeshire), whilst small numbers were marked in Lancashire and north-east Scotland. On Skokholm (Pembrokeshire), where a long-term study of that island's breeding Oystercatchers was begun in 1963 by the Edward Grey Institute of Field Ornithology (Harris 1967), a colour-banding scheme was devised to co-ordinate closely with the M.A.F.F. project. Between 1963 and 1965 a combined total of 276 breeding adults was ringed and colour-banded in the various areas, birds from Skokholm and Anglesey being marked with individually unique codes. In addition, ca. 600 chicks were colour-banded, many by voluntary assistants, in areas as far apart as Pembrokeshire, Norfolk and Shetland (ref. Appendix I).

TRAPPING TECHNIQUES

Two main methods of trapping from flocks on the shore were used: cannon-netting and flight-netting. Oystercatchers densely assembled at their daytime high-tide roosts on sandy and shingly beaches and on small islands, in all areas except the *Exe Estuary*, were caught by means of large missile-propelled nets ('cannon-nets') powered by electrically detonated black-powder charges. Constructional and operational details of the M.A.F.F. equipment, which was developed from the American nets described by Dill and

Thornsberry (1950), will be detailed elsewhere by Davidson and Mercer. Oystercatchers were also caught on the wing, on dark nights, in nets ('flight-nets') erected across the approaches to their roosts on the upper sandy shores or salt-marshes in *Morecambe Bay* and the *Exe Estuary*. On a much smaller scale, elastic-powered clap-nets were operated at daylight roosts in *Conway Bay* during the 1964 autumn. Of the Oystercatchers ringed, 4 394 were taken by cannon-netting, 810 by flight-netting, and 177 by clap-netting. Full details of all catches are given in Appendix I.

Although notable catches were made with each technique, and especially with cannon-netting, the overall trapping success was very erratic and nowhere did it prove possible to net Oystercatchers regularly in large quantities. This was due partly to developmental problems and partly to various uncontrollable environmental and behavioural factors. These factors included: frequently adverse weather and tidal conditions, sudden and unpredictable changes in roosting or flighting patterns and in the degree of flock restlessness or wariness, and inadvertent human disturbance—for example, from aircraft and small boats.

Breeding birds were caught at their nests either in drop-door wire cage traps automatically operated by small dry batteries and a relay, or in small automatic spring-loaded clap-nets. At each nest, dummy eggs were substituted temporarily for the real clutch, the latter being placed in an insulated container during the short period of trapping. No adults were injured and no clutches damaged or deserted as a result of trapping. Indeed, some Oystercatchers were re-trapped as many as five times during the incubation period.

COLOUR-BANDING

Initially, colour-bands were cut from lengths of soft P.V.C. tubing and fastened either by an impact adhesive ('Evostik' was used by M.A.F.F. workers) or by 'Tensol' cement (used by White and Gittins). To accelerate the banding process, and to minimize any loss of bands due to faulty fastening, 'Evostik' was superseded by stainless steel staples in October 1963 for virtually all subsequent M.A.F.F. colour-banding, whilst in January 1964 White and Gittins converted entirely to hard P.V.C. ('Darvic') bands of the type described by Coulson (1963). The durability of all plastic materials proved very satisfactory, and staples examined after being more than two years on Oystercatchers showed no significant abrasion or corrosion. In the field, some loss of the adhesive bands was occasionally noted but failures of either stapled or 'Darvic' bands were rare. Information on the incidence of band losses, obtained from finders of dead marked Oystercatchers and from retrapped birds (Table 25, in Appendix I), indicates that probably not more than 5 per cent of birds lost all their adhesive bands during the course of the project. Losses were probably due more to hasty fastening than to a later failure of the materials. The partial loss of a multiple code usually proved to be less serious, since the relative positions of the surviving band(s) and the metal ring still often enabled the bird to be referred correctly at least to its area of marking.

Codes to indicate area and date of marking, and sometimes also age classes and particular individuals, were devised from a range of seven contrasting bright colours—red, orange, yellow, green, blue, white and black. All proved to be satisfactorily fast, with the notable exception of the soft P.V.C. red which turned brownish within six months and became difficult to discern under most conditions. This particular red was therefore used as little as possible. Soft white bands very occasionally became stained. Soft yellow faded fairly rapidly but evenly to a pale cream which nevertheless remained distinguishable from white to the experienced eye. Soft blue, green and orange, and hard red and hard yellow bands were all markedly resistant to fading and, of course, black did not change.

Since most Oystercatchers have a 'tarsal' (tarso-metatarsus) length of 45–50 mm combinations of up to three colour-bands and the metal ring could be used safely on a bird. Not more than two bands, or one band and the metal ring, were placed on each leg. Two sizes of soft P.V.C. bands were employed: tall (20–25 mm) for use singly on a leg, and short (12–15 mm). Hard P.V.C. bands were all ca. 10–12 mm long. Thus, bands and ring seldom occupied much more than half the tarsal length, and their maximum combined weight (ca. 4 g) was negligible compared with the normal body weight of an Oystercatcher (450–650 g).

Observations for colour-banded birds were made usually with telescopes ($\times 15$ to $\times 60$ magnification) but sometimes with 10×50 binoculars. In normal good light conditions colour codes were clearly identifiable at 100–200 metres and occasionally at 300 metres or more. The use of a Land-Rover proved invaluable in enabling frequent approaches to be made close to flocks feeding or roosting on mussel scars and firm sands, whilst birds breeding or feeding in roadside fields were likewise most easily watched from a motor vehicle.

SECTION II
MOVEMENTS OF THE BRITISH BREEDING POPULATION

THE ADULT POPULATION

British Oystercatchers breed mainly around our northern and western shores, although many also nest far inland in several regions of Scotland and northern England. Probably three-quarters of our native birds breed in Scotland, whilst the north and west coasts of Ireland are also important breeding areas. Comparatively few Oystercatchers (probably under 10 per cent) nest in England and Wales, however, and these are found mainly in north-west England, on Welsh islands and in north Norfolk (Dare 1966).

In common with Oystercatchers elsewhere in northern Europe the British birds are generally considered to be only summer visitors to their breeding areas (Witherby *et al.* 1940). Certainly, all inland nesting grounds are completely deserted after the breeding season, whilst most birds nesting on the Scottish islands also abandon their breeding haunts in late summer (Baxter and Rintoul 1953, Venables and Venables 1955, Davis 1963). The winter numbers of Oystercatchers found on these islands, as also along the rocky mainland shores of north and west Scotland, are generally far below the breeding strength. Whilst such birds could be local residents they seem more likely to be mainly winter visitors and transients. Further south—in Ireland, Wales and England—the situation is obscured by the large numbers of Oystercatchers which occur at all seasons in some of the major coastal breeding areas, such as north-west England, Anglesey and Norfolk. There, as elsewhere, the nesting territories themselves are deserted outside the breeding season, but only extensive ringing will reveal the seasonal movements of these breeding populations. Reference will be made later to the initial results obtained from current marking studies of Welsh island populations.

Arrival on breeding grounds

Much of the information summarized here has been extracted from reports sent by local observers to a recent British Trust for Ornithology enquiry into inland breeding by Oystercatchers in northern Britain (Buxton 1962) and kindly made available to the writer by the B.T.O. To some of these inland haunts Oystercatchers return so early in the year that they may be the first harbingers of spring. There are, however, considerable annual and local variations in first arrival dates, due largely to prevailing weather conditions but also, perhaps, to the size of local populations. For where Oystercatchers breed plentifully inland, as for example in the eastern highlands of Scotland, they appear to return markedly earlier than do those birds comprising the much smaller and more diffuse populations nesting in south-east Scotland and north-east England. According to D. Nethersole-Thompson (in Bannerman 1961) the Oystercatchers of Strathspey always return to their nesting grounds by night, but there appears to be no comparable information for other areas.

In certain years very early arrivals have been recorded in the eastern highlands and south-west Scotland from mid-January onwards. Normally they are expected in early or mid-February, whilst the main arrival period in most inland areas is late February and early March. The inland breeders in north-west England behave similarly. In upland regions it is not unusual for the first Oystercatchers to re-appear prematurely while their nesting grounds are snow-covered and frozen, or, should the birds arrive in milder weather, for subsequent wintry conditions to force them back to lower levels or to the coast. The whole arrival pattern is so dependent upon the severity of the late winter and early spring weather that the difference between an early year and a late one may be as much as four to six weeks.

Over the British Isles as a whole the majority of breeding Oystercatchers take up territories during March, with late-comers settling in during April. Witherby *et al.* (1940) note that the earliest pairs select their breeding territories by the middle of February. However, at Walney Island, on the Lancashire coast, Oystercatchers were already paired up on territory by January 16 in 1965 (pers. obs.) and by January 18

in 1966 (A. J. Mercer, pers. comm.), and incipient territorial display flights and 'song' have been noted on the coast of Galloway as early as January 22 (pers. obs.). In the northern isles the spring return reaches Fair Isle usually in early or mid-February, with the main body of birds appearing in late February or early March (Davis 1963). In Shetland the main arrival occurs in mid-March (Venables and Venables 1955). By comparison, in the Faeroe Islands, 200 miles north-west of Shetland, the first Oystercatchers re-appear at the beginning of March, and most return during the latter half of that month (Williamson 1948). In south and west Norway returning Oystercatchers are usually first recorded early in March, occasionally in late February, but it is sometimes the end of April before they reach the extreme north-east of that country (Holgersen 1962). Further south, Oystercatchers arrive in Denmark in late February or the first half of March (Salomonsen 1953), but they do not penetrate up the Baltic coasts as far as Estonia until the first half of April (Professor E. Kumari, pers. comm.).

The very early start of the northerly spring movement can be detected in southern Britain by frequent counts of the Oystercatcher flocks in an area. Thus, in the *Burry Inlet*, South Wales, a five-year study of the large wintering population of that estuary has shown that the spring emigration begins each year about mid-January (Davidson 1967). In the *Exe Estuary* a similar decline in numbers is usually apparent from early February onwards (R. G. Adams, pers. comm.). Further north, in *Morecambe Bay*, on the other hand, although a marked fall in Oystercatcher numbers is not always evident until early March, due presumably to influxes of birds arriving from more southerly haunts, the onset of spring passage is revealed more reliably by audible nocturnal migrations. These movements, which have been recorded annually at Grange-over-Sands, at the head of the bay, take place usually from early February until mid-April (D. G. Harrison, pers. comm.). Thus, during the four years 1963–66 the first dates on which night movements were heard varied from February 1 (1964) to February 13 (1963). However, in 1967, following a very mild winter, northerly movement was recorded almost nightly from January 26. This emigration consists of northerly overland departures, during the evening, from the northern end of *Morecambe Bay* (Kent Estuary). Flocks set off with characteristic high-intensity migratory calls and head away over the nearby hills on a northerly bearing which, if maintained, would take them on a 55 miles' flight over the Lake District mountains directly to the head of the Solway Firth, with the Firth of Forth and the Scottish east coast only a further 70 miles distant across the southern uplands. Departures occur even with the ground snow-covered and frozen hard, as it was in February 1963, but flocks have been heard returning to the shore in apparent disarray upon encountering hill-fog blanketing the 150 m high fells which border the bay at the departure point. The dates given above for the spring arrival of Oystercatchers in the various parts of their breeding range suggest strongly that the initial departures from British wintering haunts refer largely to Scottish and other native populations, rather than to foreign visitors, which probably begin their northerly migrations somewhat later.

Fidelity to breeding sites

Recent breeding population studies have shown that the Oystercatcher tends to be a very long-lived species which generally breeds in the vicinity of its birth-place and often returns to the same territory, and hence to a particular mate, for a number of years. On the German island of Mellum the ringed population in some years has contained individuals of nearly all ages up to 34 years (Drost and Hartmann 1949, Goethe and Kramer 1962, Grosskopf 1964), and some pairs were found to reform for at least six successive breeding seasons (Jungfer 1954). In Britain, Harris (1967) showed by colour-banding that a high proportion of Skokholm Oystercatchers remained faithful to their individual territories and mates during the first three years of the long-term study of that population. Work in progress by A. J. Mercer and the writer on the adjacent island of Skomer, and also on Anglesey, is revealing similar patterns of behaviour.

It is not unusual for the same nest scrape to be re-occupied each year if it is in a firm substrate such as turf, or on a rocky ledge. Armstrong (1947) cited a particular male Oystercatcher, recognized by a limp, which bred in the same area at Scolt Head, Norfolk, for 18 years. When its mate died on the nest the male's new partner—an exceptionally tame bird which laid distinctively marked eggs—continued to use the original nest scrape for a further eight years.

Departure from breeding grounds

According to Witherby *et al.* (1940) the British population begins to disperse from its breeding areas in mid-July, occasionally in the first week. Inland in Inverness-shire post-breeding assemblies composed entirely of adults occur as early as July 2, the absence of accompanying fledglings suggesting that these are failed breeders (pers. obs.). Unfortunately, however, it is not known whether young Oystercatchers normally disperse with their parents or independently. Moreover, while the first individuals to desert the breeding sites may, in fact, be those which have failed to rear young, it seems equally possible that successful early breeders are also ready to depart by mid-July. Thus, both in the eastern Scottish Highlands and in Pembrokeshire early broods may be on the wing by June 15–20 (pers. obs.), sometimes—even in the former area—in the first week of June (A. J. Mercer, pers. comm.).

Information sent to the B.T.O. enquiry shows that the majority of inland-breeding Oystercatchers leave their northern haunts during late July and the first half of August. Only a very few stragglers linger into September. An essentially similar dispersal pattern has been observed in those coastal haunts in Lancashire and Wales with which the writer is acquainted. The last birds to disperse are almost certainly late breeders, for a few youngsters, reared from replacement clutches, do not fledge until the first or second weeks of August. Several August fledging records are evident for Scotland, Norfolk and Skokholm from the B.T.O. ringing data, and the writer has comparable observations for both Norfolk and Anglesey.

The break-up of breeding populations can be detected much farther south by regular observation of those flocks of non-breeding Oystercatchers, mainly in drab immature plumages, which have remained behind to summer in the winter quarters (Dare 1966). Among such flocks the first influx of returning adults, still in their brilliant breeding dress, is usually apparent by late July, even as far south as the *Exe Estuary* (R. G. Adams, pers. comm.). On the Lincolnshire coast Smith and Cornwallis (1955) state that the first arrivals are usually noted about mid-July, and in *Conway Bay*, North Wales, returning adults may be present in some numbers by the third week of July (pers. obs.).

Movement to winter quarters

More precise information on the post-breeding dispersal and eventual winter quarters of adult British Oystercatchers has been obtained only in the last few years, from ringing and colour-banding birds trapped at the nest and from recoveries on or near their nesting grounds of birds ringed in wintering areas. The limited data so far available will now be examined.

The whereabouts during the non-breeding season of some adult Oystercatchers from the more northerly parts of the British range are indicated in Table 1. This lists the 59 recoveries on breeding grounds of birds ringed as adults between August and March in certain wintering areas in England and Wales (see also Figures. 11–14). Sightings of colour-banded Oystercatchers are omitted, since specific age-class codes were not employed except for certain *Dee Estuary* catches.

These records show a considerable southerly dispersal in autumn of adult Oystercatchers from northern Scotland, involving both inland and coastal breeders, for distances ranging up to ca. 675 miles (Shetland to south Devon). Later, it will be demonstrated that comparable autumn dispersal movements are undertaken by many birds-of-the-year from this region. Unfortunately, there are very few recoveries for Oystercatchers breeding in southern Scotland and northern England.

The post-breeding dispersal of adults from more southerly populations on the Welsh islands of Anglesey, Skomer and Skokholm is currently being traced by direct observation of birds caught at the nest and marked with individually recognizable colour codes, as well as by the conventional ringing method. On Anglesey, 80 breeders were marked during 1964 and 1965 from a total population of ca. 150 pairs. At the time of writing (March 1967) none has yet been recovered dead, but there have been 32 sight records (referring to 28 individuals) out of the breeding season, between September and January. Only 15 birds (16 sightings) were recorded on Anglesey itself during these months despite systematic observations at all haunts, whereas 13 birds (16 sightings) were noted on the mainland nearby, and all in autumn. Of the latter group none was seen more than two miles east of Anglesey along the well-watched coast of North

Wales, where Oystercatchers are very numerous, but several were found 40 miles southwards during regular surveys of the small flocks which frequent the northern half of Cardigan Bay. In the two most important wintering centres south of Anglesey, namely the *Burry Inlet* and the *Exe Estuary*, in both of which Oystercatcher flocks are regularly scrutinized by experienced observers, only two Anglesey breeders have been recorded (both in the *Burry Inlet* in November) whereas marked adults from the Pembrokeshire islands have been seen on various occasions. Thus, whilst most Anglesey adults certainly desert their island after breeding, their main wintering area is still undiscovered.

More is known, however, about the movements of Oystercatchers from Skokholm, where about 130 breeding adults were uniquely colour-marked between 1963 and 1965 (Harris 1967). This population displays considerable individual variation in its post-breeding behaviour. Thus, whilst some birds go no further than the adjacent mainland, and revisit the island at intervals throughout the autumn and winter, others scatter over a far wider area. Some move eastwards along the South Wales coast to *Burry Inlet*, where eight have been seen and three recovered dead between August and January, but one which had moved to the west was found dead in Co. Kerry (Ireland) in January. Others have crossed Devon southeastwards to the *Exe Estuary* (three birds sighted in August and October) and one was recovered, further in the same direction, in northern France (Manche) in December. This last bird provided the first proof of movement abroad by adult British Oystercatchers. The Oystercatchers from neighbouring Skomer, where 21 birds were marked between 1963 and 1965, disperse similarly and have provided two autumn sight records from the mainland opposite, two in *Burry Inlet* in autumn and winter, and a French (west Finistére) recovery in December.

Table 1 Recoveries on northern breeding grounds of British Oystercatchers ringed as adults between August and March in wintering areas in England and Wales (all refer to birds marked under the M.A.F.F. project, except for the one from the Wash and two of those from the Dee Estuary)

Breeding grounds		Wintering (ringing) areas					
Area	Number of recoveries	Morecambe Bay	Dee Estuary	Conway Bay	Burry Inlet	Exe Estuary	The Wash
Northern Scotland *from Tay northwards*	51	12	22	4	10	2	1
Southern Scotland	4	1	1		2		
Northern England	4	2	1		1		
Totals	59	15	24	4	13	2	1

THE IMMATURE POPULATION

Material analysed

Data on the migrations of immature Oystercatchers have been obtained almost entirely from ringing them as chicks (pulli). However, the recent trapping in British wintering areas of some immature birds, even if of unknown natal origin, has provided a little more information on their movements during the later phases of immaturity. Buxton's (1957) analysis dealt with the 159 acceptable recoveries of British-ringed pulli which had been notified up to 28 February 1957. The present analysis covers all dead recoveries as well as retraps ('controls') reported by 1 June 1966 except the following classes of recovery: only ring found, only leg bearing ring found, ring found in gull pellet, and skeleton of ringed bird found. None of these can be dated at all accurately and some undoubtedly refer to pre-fledging mortality. One record of a ringed skeleton is included, however, because of its noteworthy place of recovery (Morocco).

Oystercatcher pulli may be ringed at any time between mid-May and early August, although the majority are ringed in June and early July. First fledging occurs usually about mid-June, with marked local and seasonal variations, and the fledglings then remain dependent upon their parents for, perhaps, several more weeks, though extremely little is known about this period in their lives. To reduce undue bias resulting from late breeding, and from the mortality of both unfledged chicks and fledged youngsters before they have really begun to disperse, all recoveries before September 1 in the first year of life are excluded unless a movement of 10 miles or more is indicated. Any dual records of individuals having been retrapped or picked up exhausted at one time and then released, only to be found dead much later elsewhere, are counted as two separate recoveries. After consideration of all these factors 275 recoveries remain for analysis. Full details are given in Appendix II. These recoveries have accrued from the ringing, up to and including 1965, of some 7 500 pulli—a useful recovery rate of 3–4 per cent. Table 2 shows that at least one quarter (and probably one third) of the dead recoveries resulted from shooting or some other form of killing by man, especially in Ireland, Lancashire and France. Indeed, of all recoveries abroad, nearly two-thirds can be attributed directly to human destruction and predation.

Table 2 Manner of recovery of British Oystercatchers ringed as pulli

1	Caught or trapped, and released with ring (controlled)	19
2	Found dead, dying or injured	164
3	Shot or otherwise killed by man	65
4	Accidentally caught in fishing gear (nets, hooked lines, etc.)	7
5	Killed by overhead wires and high-tension cables	3
6	Killed by aircraft	1
7	Manner of recovery imperfectly known	16
Total		275

Notes
1. Of all certain dead recoveries (categories 2, 3, 5 and 6) 65 (28 per cent) were due directly to killing by man. This figure is minimal, since category 2 must include some shot birds; 33 per cent is probably a more realistic figure. Nearly half (30) of the birds killed were in France and Iberia.
2. Category 1 includes several birds picked up exhausted.

Figure 1 Recoveries within the British Isles of Oystercatchers ringed as pulli in northern Scotland (to the north of the broken line), showing the general south-westerly initial dispersal of the young birds from this region. Numerals adjacent to the symbols indicate the month of recovery. The main ringing areas were in Shetland and the eastern highlands. Twelve recoveries abroad—western France (8), Iberia (3) and southern Norway (1)—are incorporated in Figure 6.

The age determination of recovered birds is based on a year starting June 1, which is approximately the beginning of the main hatching period for the British population as a whole. Very little is yet known about the age at which Oystercatchers mature. On the basis of plumage changes Dircksen (1932) postulated that they breed for the first time in their third spring, i.e. when nearly three years old, but there has since been only limited ringing evidence to support his theory. Jungfer (1954), referring to the long-term ringing study of Mellum Oystercatchers, quoted only one instance of a three-year-old bird proved to be breeding. Harris (1967) found that whilst some Skokholm Oystercatchers may breed in their third year others did not start breeding until the fourth year. Further evidence that first breeding may be delayed until after the third year is given by Dare (1966). Because of these individual variations recoveries during each of the first three years of life will be dealt with separately, whilst all birds recovered during or after their fourth year can be considered adult.

The interpretation of Oystercatcher recoveries material is subject to various inherent sources of bias which together preclude statistical evaluation of the data. These sources of bias include unknown local, regional and seasonal differences in the chances of Oystercatchers being killed by man, and of dead ringed birds being found and reported, as well as problems of ascertaining exactly when and where a bird died. Thus, one found freshly dead on the first day of a given month could have died during the preceding month, whilst another in an advanced stage of decomposition may have been dead more than one month. No allowance can reasonably be made for all these factors, nor for any record where the actual date of recovery is unknown. Moreover, since coastal recoveries often refer to birds washed up along the tide-line, the place of discovery need not be at or near the actual place of death, because the corpse may have been drifted some distance by strong inshore currents.

Initial dispersal from the natal areas

The recoveries within the British Isles of young Oystercatchers from the main areas of ringing are plotted in Figures 1–5. The distribution of all recoveries abroad, irrespective of area of birth, is shown in Figure 6, whilst Table 3 compares the incidence of recoveries within the British Isles and abroad of birds ringed in various parts of Britain. The overall pattern of the initial autumn dispersal from the natal areas is that of a marked southerly movement, with considerable emigration to the Breton and Biscay coasts of France and, though to a much lesser extent, to Iberia. There are, however, some pronounced differences in dispersal behaviour between populations.

As might be expected, Oystercatchers from the northern half of Scotland display the most striking movements (Figure 1), and all but 20 of the 103 recoveries from this region relate to birds reared in Shetland and the eastern Highlands. From these two centres there is a very distinct migration south and southwestwards to the main British west-coast wintering grounds in Ireland, Wales and north-west England, as well as beyond to western France and Iberia. Many youngsters cover 400–800 miles within a few weeks or months of fledging. Very few appear to travel via the east coast of England, however, and evidently most leave the Scottish east coast at the Firth of Forth and traverse southwards over the southern uplands to the Solway Firth. Andrew (1959) was the first to draw attention to the large autumnal movements of Oystercatchers which at night cross southern Scotland from the North Sea to the Irish Sea coasts by this route. There is only one first-autumn recovery north of the birth-place, but this refers to a bird reared beside the R. Spey which had made its way down this north-east flowing river to the coast where it was recovered near Banff. The few recoveries of Oystercatchers bred in southern Scotland suggest an essentially similar southwards dispersal for this population (Figure 2).

The Oystercatchers of north-west England (Figure 3) behave very differently, on the other hand, being as sedentary as the Scottish population is migratory. Birds from inland sites move the short distance down to the coast, where they mingle with others reared on the beaches and salt-marshes, and apparently settle in the two great wintering haunts of the Solway Firth and *Morecambe Bay*. Few venture as far south even as North Wales and the *Dee Estuary*, although there have been two recoveries in France. Oystercatchers from the relatively isolated population of north Norfolk (Figure 4) also seem to comprise a rather sedentary stock; these show a strong tendency to remain nearby in the rich feeding grounds of The Wash and

Figure 2 Recoveries within the British Isles of Oystercatchers ringed as pulli in southern Scotland (the area enclosed by the broken lines). Numerals adjacent to the symbols indicate the month of recovery. One recovery abroad—in north-west France—is included in Figure 6.

Table 3 The numbers of British-ringed Oystercatcher pulli recovered in the British Isles and in other countries

Area of birth (ringing)	Number of recoveries			Distribution of recoveries abroad					
	Total	British Isles	Abroad	Norway	Holland	France*	Spain	Portugal	Morocco
Northern Scotland *north of Tay and Argyll*	103	91	12	1		8	2	1	
Southern Scotland *south of Tay, including Argyll*	16	15	1			1			
Northern Ireland *Co. Down*	3	2	1				1		
North-west England *Solway Firth to Dee Estuary*	54	52	2			2			
Isle of Man	13	10	3			3			
Wales *Anglesey, Caernarvonshire and Pembrokeshire*	51	29	22			18	4		
North-east England *Northumberland and Yorkshire coast*	4	4	0						
East Anglia *north Norfolk*	26	21	5		1	3			1
Southern England *Essex to Cornwall*	5	3	2			1	1		
Totals	275	227	48	1	1	36	8	1	1

* Channel Island recoveries are included with those of France.

Blakeney, Brancaster and other harbours. Observations of colour-banded birds from the Scolt Head 'colony' also indicate that some youngsters stay close to the birth-place throughout much of their immature life (R. Chestney, pers. comm.). There is, however, some southerly dispersal down the English Channel, as well as the suggestion of a limited northerly scatter.

Young Oystercatchers from the islands in the Irish Sea area are, like those of northern Scotland, largely migratory (Figure 5). Thus, youngsters from the Isle of Man, Anglesey, and the Pembrokeshire islands of Skomer and Skokholm all show a marked southerly dispersal, with an emigration to western France and Iberia, which is especially frequent among Pembrokeshire birds. It seems notable that few have been recovered in the major wintering grounds close by, Manx birds apparently tending to avoid those in north-west England and in eastern Ireland, whilst Welsh birds are comparatively seldom recorded in the *Dee Estuary* or the *Burry Inlet*. Indeed, as noted earlier, there is now proof that even some adults from the Pembrokeshire islands winter in north-west France.

These recorded differences in the dispersal behaviour of local and regional populations are sometimes, but not always, clearly related to the proximity of an important wintering centre. That young Oystercatchers from north-west England and Norfolk should tend to stay so near their natal areas is readily explicable, but it is less obvious, for instance, why the populations of north-eastern Scotland so seldom appear to utilize the important wintering haunts in the east coast firths and The Wash, or why major wintering grounds in Wales should be frequented so little by local birds. Possibly the modern dispersal patterns are traditional, reflecting some very different former distribution of the winter foods and originating prior to the first colonization of inland regions in northern Britain.

A significant proportion of young British Oystercatchers emigrate, most of them presumably during their first autumn and winter, since of the 275 recoveries used in this analysis 48 (17 per cent) were from abroad (Tables 3 and 5). There is, however, considerable regional variation in the incidence of foreign

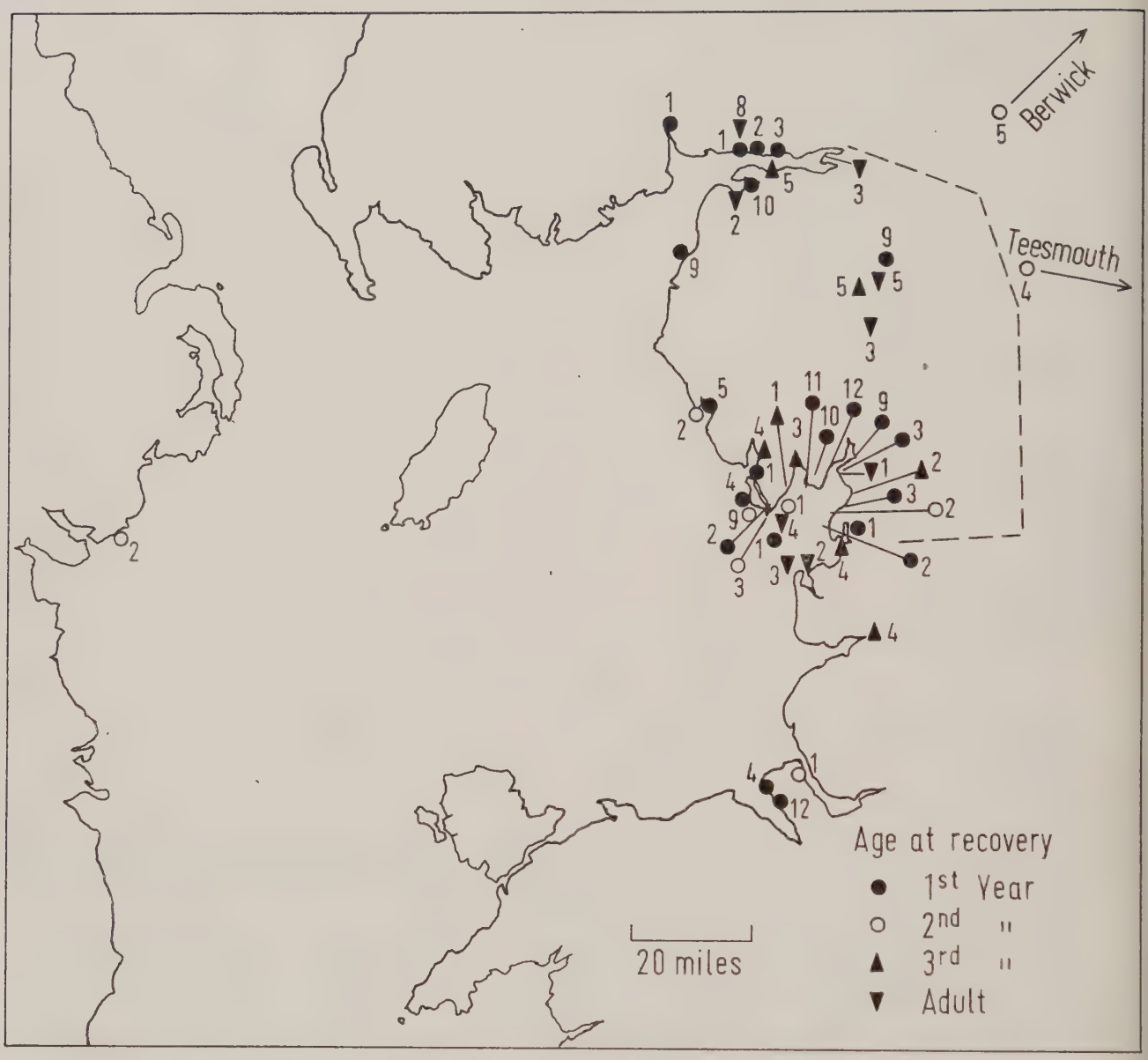

Figure 3 Recoveries within the British Isles of Oystercatchers ringed as pulli in north-west England (the area enclosed by the broken line and the coast), showing the marked tendency of the young birds from this region to remain near the birth-place rather than disperse widely. Numerals adjacent to the symbols indicate the month of recovery. Two recoveries abroad—in western France—are included in Figure 6.

recoveries, ranging from as high as 44 per cent for all Welsh reports (22 in 51) down to 4 per cent (2 in 54) for birds from north-west England. Youngsters from the Pembrokeshire islands emigrate most frequently, 52 per cent (15 in 29) of all their recoveries having been in France and Spain. From some of the most northerly breeding areas in Scotland 12 per cent (12 in 103) of recoveries have occurred abroad. The most distant recovery of any British Oystercatcher is that of a first-year bird from Scolt Head, Norfolk, whose skeleton was found in Morocco in December, a direct distance of some 1 300 miles, though much longer, of course, by a strictly coastal route. The only other British-ringed Oystercatcher to be recovered in Morocco (near Bouznika at 33°49′N, 7°10′W), and also in December, had been ringed in mid-August as a free-flying youngster in The Wash, not far from Scolt Head. This bird might, therefore, also have been of British origin rather than a passage immigrant from another country. Another notable distant recovery is of a bird reared on Mingulay, Outer Hebrides, and found 1 400 miles away in the extreme south of Spain within two months of fledging.

There are great individual differences in the distance covered during dispersal by young Oystercatchers from a given population, for there is no correlation between recovery latitude and season. Thus, birds-of-the-year from northern Scotland have been found in mid-winter (December to February) almost everywhere between the Firth of Forth and the Bay of Biscay, but one reared in Sutherland was still on the same coast in December. A similarly wide scatter persists in the first spring; one bird had even returned to its birth-place far inland in Strathspey. Likewise, youngsters from Anglesey have been recovered in their first winter both near the natal area and southwards as far as Spain. These and other interesting facets of the dispersal phenomenon can be elucidated only by particularly intensive and long-term ringing of selected large populations, preferably in well-defined areas and contrasting habitats, e.g. Norfolk sanctuaries, Shetland, and some highland river systems. The casual ringing carried out nationally for several decades has now revealed the broad frame-work and complexity of the movements, but further diffuse ringing of this sort is likely to have very little additional value.

The speed of dispersal from the birth-places, like the distance moved, is subject to great individual variation. This is most apparent among birds from northern Scotland, some of which clearly do not hurry on their journeys (Figure 1), whereas others (Table 4) migrate south very rapidly and reach France by mid or late August. The earliest recorded British emigrants, from Cumberland and Anglesey, had reached down into the Bay of Biscay by August 10 and 16 respectively. Of 28 birds recovered in France in their first autumn 11 were found before September 15, and southern Spain is sometimes reached by the first week of October.

Table 4 Records of rapid southerly dispersal and emigration of young British-ringed Oystercatchers

Natal area and date of ringing		Place and date of recovery		Southerly displacement *miles*
Cumberland	22 June 1949	France (Vendée)	10 August 1949	580
Anglesey	16 June 1953	France (Loire Inférieure)	16 August 1953	430
Shetland, Fair Isle	18 June 1961	Lancashire, Morecambe Bay	c. 19 August 1961	380
Ross-shire	21 June 1964	France (Finistère)	20 August 1964	650
Shetland, Fair Isle	21 June 1951	France (Gironde)	21 August 1951	1 050
Isle of Man	21 June 1963	France (Morbihan)	24 August 1963	450
Pembrokeshire, Skomer	26 June 1962	France (Loire Atlantique)	29 August 1962	320
Inverness-shire	17 June 1958	Ireland, Co. Kerry	30 August 1958	530
Orkney	21 June 1939	Ireland, Co. Antrim	3 September 1939	340
Shetland, Fair Isle	13 July 1963	Lincolnshire, The Wash	3 September 1963	460
Shetland, Fair Isle	22 June 1952	France (Loire Inférieure)	7 September 1952	870
Shetland, Fair Isle	6 July 1964	France (Finistère)	11 September 1964	770
Pembrokeshire, Skokholm	25 June 1930	France (Loire Inférieure)	12 September 1930	320
Outer Hebrides	2 August 1962	Spain (Cadiz)	7 October 1962	1 400

Figure 4 Recoveries within the British Isles of Oystercatchers ringed as pulli in north Norfolk (the area inset). Numerals adjacent to the symbols indicate the month of recovery. Five recoveries abroad—France (3), Holland (1) and Morocco (1)—are incorporated in Figure 6.

The early southwards dispersal may be observed by close scrutiny of the summer flocks on the shore for the first appearance of birds-of-the-year. These are easily recognized by the sombre colours of their soft parts—brown irides, pale grey legs, and black distal sector to the yellowish-orange bill (cf. Witherby *et al.* 1940). In *Conway Bay* these youngsters usually arrive around 10–15 August, but further south, in Devon, they can be present in the *Exe Estuary* much earlier, e.g. by 4 August (1964) and 6 August (1963) (pers. obs.). The Exe observations, which perhaps refer to birds from Pembrokeshire, are consistent with the ringing evidence of an early emigration to France.

There is no basis, from either recoveries or field observations, for supposing that Oystercatchers leave the breeding grounds as distinct family units, although one might expect inland breeders to make their way to the coast in such groups. On the contrary, the speed with which emigration by young birds is often performed, coupled with a scarcity of adult recoveries abroad, suggests that many youngsters migrate independently of their parents. There is clearly a pressing need for extensive ringing of both the parents and offspring of particular Oystercatcher populations.

Figure 5 Recoveries within the British Isles of Oystercatchers ringed as pulli on islands in the Irish Sea: (A) Isle of Man, (B) Anglesey, and (C) Skomer and Skokholm. All symbols are as in Figures 1–4. Twenty-five recoveries abroad—western France (21) and Spain (4)—are included in Figure 6.

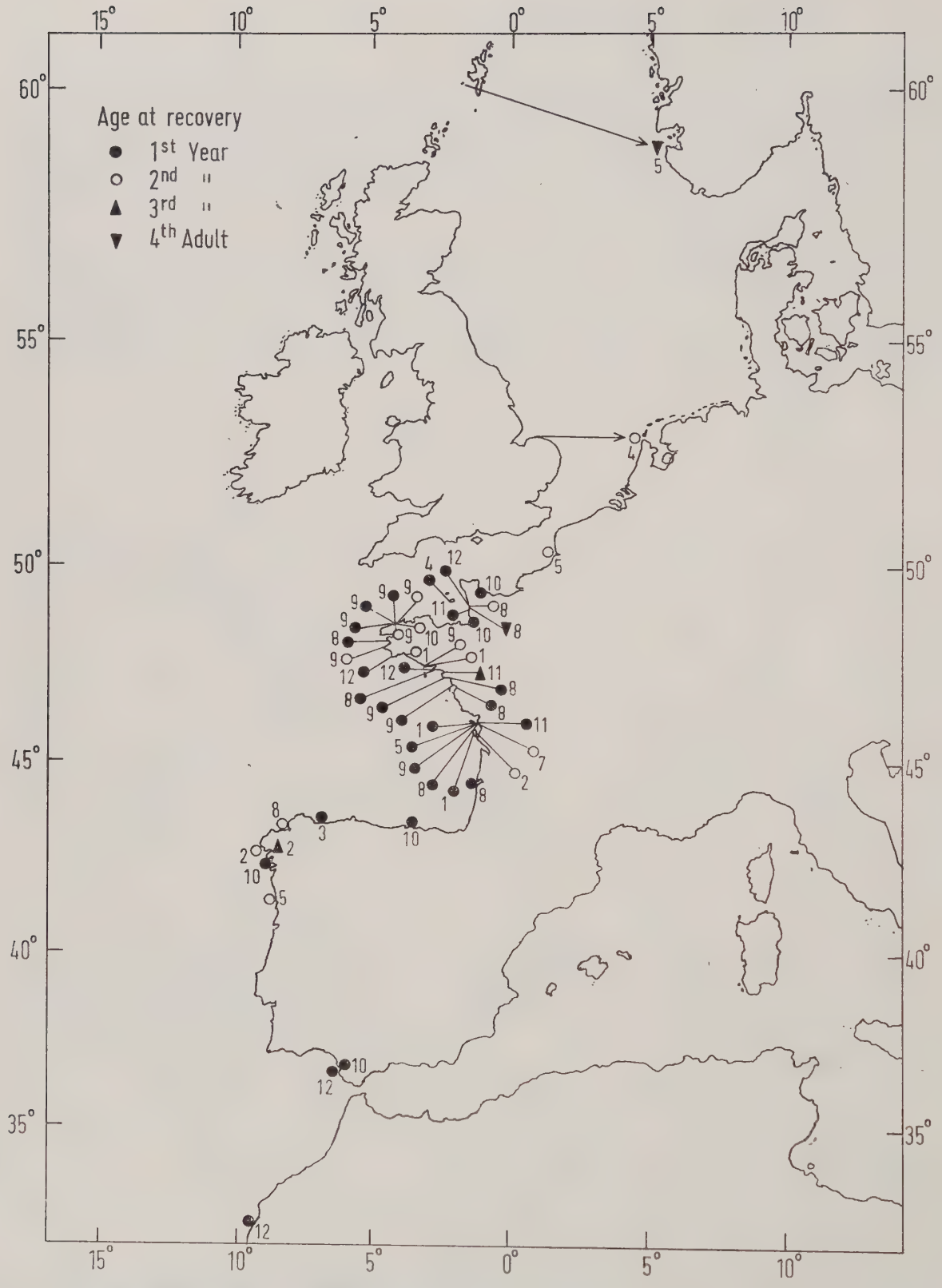

Figure 6 Recoveries abroad of British Oystercatchers ringed as pulli. Numerals adjacent to the symbols indicate the month of recovery. Most birds were ringed on Welsh islands and in northern Scotland.

Movements in later years

Here, two basic problems hinder the analysis. First, there is a shortage of data (Table 5), due to the great drop in the numbers recovered after their first year; this can be ascribed mainly to a high first-year mortality followed by a lower death-rate in subsequent years. Secondly, for these older individuals their recovery affords few clues to any seasonal or other movements undertaken before death. These problems can be surmounted by large-scale ringing and retrapping of the immature Oystercatchers in both wintering and summering areas, and the initial results of limited M.A.F.F. work along these lines are noted later in this paper.

Table 5 The age distribution of British Oystercatchers ringed as pulli and recovered dead in the British Isles, and in other countries

	Month of recovery												Totals	
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May		
Recovered in the British Isles														
1st year		*1*	*5*	22	13	8	8	22	11	12	10	7	113	*119*
2nd year	2	2		3	1	1	5	8	5	6	1	1	35	
3rd year		2	2				1	1	3	1	3	2	15	
4th–14th year	1	2	4	1	1	0	6	4	5	7	3	2	36	
Total													199	*205*
Recovered abroad														
1st year			*6*	6	5	2	5	2		1	1	1	23	*29*
2nd year		1	2	3	1			3	2		1	2	15	
3rd year						1			1				2	
4th year			1									1	2	
Total													42	*48*
Grand total													241	*253*

Notes
1. The oldest recovery in the British Isles was in its 14th year; other adults were in 11th (1), 10th (1), 9th (1), 8th (1), 7th (6), 6th (4), 5th (7), 4th (14).
2. The oldest recovery abroad was in its 4th year.
3. Figures in italics refer to birds recovered before 1 September in their first year which had moved more than 10 miles. Italic totals are the totals including these birds.

Consideration of the recovery distributions shown in Figures 1–6 and Table 5 indicates the following general features: (i) all age groups of Oystercatchers intermingle in the British wintering haunts; (ii) some second-year birds occur in France and Iberia in all seasons of the year, but there are extremely few records of third-year and older (i.e. fully adult) British birds abroad, even in winter; (iii) immatures from northern Scotland, unlike those from Norfolk and north-west England, tend to remain well away from their birth-places during the first two years; and (iv) a number of third-year birds return to their areas of birth during the breeding season and some perhaps start breeding at this age.

Several Oystercatchers have been recovered, when adult, at or near their birth-places during the breeding season. Whilst this is probably normal (Jungfer 1954, Harris 1967), there is proof that some individuals settle to breed away from the natal area. At Holbeach Marsh, Lincolnshire, two birds caught on their nesting territories had been ringed as pulli, one on the Yorkshire coast at Spurn, 50 miles to the north,

and one in north Kent, some 100 miles to the south. They were in their fourth and seventh years respectively. The recovery in southern Norway of a Shetland bird as an adult, in mid-May of its fourth year, might indicate an even wider interchange among breeding populations. However, in the absence of any positive evidence of its nesting in Norway, this bird may merely have strayed on spring passage, for instance by associating with a migrating flock of Scandinavian Oystercatchers.

The recorded movements of 49 young Oystercatchers ringed during their first autumn, winter or spring in passage and wintering areas by the M.A.F.F. teams are summarized in Table 6. Unfortunately, the natal areas and even nationalities of these birds were not ascertainable. Nevertheless, these data do suggest that, after their initial dispersal from birth-places, youngsters may tend to be relatively sedentary for their first two years, 41 of the 49 recoveries or retraps being in the area of ringing. Little can be deduced from recoveries of Oystercatchers ringed as older immatures, since their age at ringing cannot usually be accurately determined and, in addition, many may become adult prior to being recovered.

Table 6 Recoveries and recaptures during their first three years of life of Oystercatchers ringed as first-year birds in passage and wintering areas

1st year's month of ringing	Number of recoveries	Year and month of recovery																													
		1st year									2nd year													3rd year								
		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
September	7					1v		1				1			1					1					2z								
October	6			1	1	1	1	1							1					1												
November	5			3y	2																											
December	3				1	1					1																					
January	14						1	2			4	1w				1	1x	1w									1w	1			1		
February	6							3								1		2														
March	7										3					2	1													1w		
April	1																			1												

Notes

1. 41 of the 49 recoveries and recaptures were in their respective areas of ringing.
2. v recovered 127 miles south. w recovered 45–55 miles north. x recovered 37 miles west. y includes one recovered 16 miles west. z includes one recovered in France.
3. Of the 49 recoveries: 37 were ringed in the *Dee Estuary*, 9 in *Morecambe Bay*, and one each in *Conway Bay*, *Burry Inlet* and *Exe Estuary*.

SECTION III
ORIGINS OF THE BRITISH WINTERING POPULATION

INFORMATION on the breeding areas of Oystercatchers which visit or winter in the British Isles is derived from two sources: (i) recoveries in this country of birds ringed as pulli in Britain and in other countries; (ii) recoveries on their breeding grounds of birds marked in the British wintering areas.

The contribution of native British Oystercatchers to the wintering population is evidently considerable, as the recoveries of ringed pulli have already shown. In Ireland, Wales and western England large numbers of Scottish-bred immature Oystercatchers occur in addition to those reared more locally. In East Anglia, on the other hand, although the large wintering flocks certainly contain some birds from nearby breeding populations, the numbers coming from northern Britain appear to be quite small. The extent to which flocks in this region and along the English Channel coast might be drawn from Continental breeding sources is but one of the problems requiring early investigation.

All recoveries in the British Isles of Oystercatchers ringed as pulli in other countries, and notified up to 31 December 1966, are shown in Figures 7–10; full details are given in Appendix IV (Tables 30–33). Table 7 summarizes the geographical and age distribution of foreign recoveries from each of the different countries and also compares the numbers of pulli ringed in each country. For countries other than the British Isles ringing effort and recoveries data have been extracted from the national bird-ringing scheme reports. No information is yet available from Germany, but the Baltic, Danish and Dutch recoveries data should suffice to indicate the likely migrations of young German Oystercatchers. Only very small numbers of pulli have been ringed in all the U.S.S.R.—some 300 between 1925 and 1954, including all birds ringed in the Latvian S.S.R. since 1941 and in the Estonian S.S.R. since 1947 (Shevareva 1957). Although this survey is not fully complete the data given cover a span of years wide enough to present a reasonable outline of the initial dispersal movements of young Oystercatchers in the general area of the British Isles.

The foreign recoveries of Oystercatchers ringed as pulli in Iceland (Figure 7) and in the Faeroe Islands (Figure 8) show that the British Isles constitute the primary dispersal area for immatures from these two very large breeding populations, and some of these birds have been found here later as adults in autumn and winter. Most recoveries are on the western coasts of Britain, especially in Ireland, and only one (a Faeroese bird) has yet been found in France (Pas de Calais).* About one fifth of all young Norwegian Oystercatchers to be recovered abroad have been found in the British Isles (Figure 9); the rest have occurred in Continental Europe as far south as northern Spain. The vast majority of Scandinavian and Baltic Oystercatchers (Table 7), together with those bred in Holland (Figure 10), by-pass the British Isles by dispersing down the southern shores of the North Sea and then following the north coast of France. By this route, large numbers of Dutch birds, and some from Scandinavia, reach the Biscay coast and beyond, where presumably they mingle with emigrant youngsters of the British population (Figure 6). Less than 5 per cent of the Dutch foreign recoveries have been found in the British Isles and none from countries bordering the Baltic Sea. However, a Danish breeding adult from the Baltic island of Saltholm has been recovered in Essex (Table 33). Of the five Dutch Oystercatchers recovered in the British Isles, one was found in its first autumn in Sussex, two in their first spring in Lancashire and south Devon, one in its second winter in Yorkshire, and the last—in its twenty-ninth winter (!)—in Suffolk. There is only one recovery of a German Oystercatcher in the British Isles, a bird from the north Friesian island of Sylt, recovered in Glamorgan during its tenth winter. The comparatively rare visits to this country of Oystercatchers from populations breeding to the east of the British Isles reflect an apparently innate or traditional avoidance of the narrow (20–25 miles) crossing of the eastern end of the English Channel. This is in striking contrast to the frequency with which young British birds emigrate across the Channel at its far wider (60–100 miles) western end.

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* The recent recovery in the Faeroes (Suderoy, 5 April 1966) of an adult Oystercatcher ringed in western France (Vendée, 25 August 1965) shows that some Faeroese birds winter south of the British Isles.

There have been four other recoveries in Britain of Oystercatchers from Holland, but these were all ringed during autumn passage as adults of unknown breeding origin (Table 33). One of these, found in Shetland in June, suggests a British breeding bird 'off-course' in Holland during southerly migration; another, found in *Morecambe Bay* thirteen months after being ringed, points to a radical change in migration route or wintering ground. The other two recoveries, which were from extreme south-east England (Kent and Suffolk) in the severe winter of early 1963, probably reflect a hard-weather movement. Indeed, the Suffolk bird actually came aboard a ship 30 miles offshore.

Table 7 Foreign recoveries of Oystercatchers ringed as pulli in the different countries of Northern Europe

Country of birth	Ringing effort		Recoveries abroad, see below		Age at recovery (years)			
	Approx. number	Period of years	Period of years	Total number	1st	2nd	3rd	Adult
Iceland	150	to 1952 inclusive	1934–65	13	7	1	2	3
Faeroes	?	?	1925–63	17	11	2	1	3
British Isles	7 500	to 1965 inclusive	1910–65	48	29	15	2	2
Norway	1 200	to 1963 inclusive	up to 1964	35	23	——12——		
Sweden	2 000	to 1960 inclusive	1929–59	24	16	4	0	4
Finland	570	to 1962 inclusive	1929–62	13	12	0	0	1
N. Russia*	?	?	1954–60	3				
Estonia	300	1922–63 inclusive	1926–65	5				
Denmark	1 000	1951–60	1925–63	21	9	5	3	4
Holland	6 500	1911–62	1912–62	99	64	10	6	19
Belgium	50	1960–63	1932–63	3				
France	75	1924–61	1924–61	0				

Table 7—continued

Country of birth	Recoveries abroad, per country; for totals, see above										
	Finland *south*	Norway *south*	Denmark	Germany *North Sea coast*	Holland	Belgium	British Isles	France		Iberia *Atlantic coast*	Morocco
								North coast	*West coast*		
Iceland							13				
Faeroes							16	1	0		
British Isles		1			1			15	21	9	1
Norway			5	4	5		7	7	6	1	
Sweden			10	1	3			8	2		
Finland			5	2	3			3	0		
N. Russia*	1	1	1								
Estonia				2		1		2	0		
Denmark				2	9			6	4		
Holland	1			2		7	5	48	27	8	1
Belgium								3	0		
France											

Notes Both the Dutch and Norwegian recoveries include single 1965 records in the British Isles.
* White Sea area.

Figure 7 All foreign recoveries of Icelandic Oystercatchers ringed as pulli. Numerals adjacent to symbols indicate the month of recovery; ages at recovery are given in Tables 7 and 30. Also shown is one recovery (from Argyll) of a bird ringed as adult. The approximate direction of the autumn movement from Iceland is indicated by the arrow.

Figure 8 All foreign recoveries of Faeroese Oystercatchers ringed as pulli. Numerals adjacent to symbols indicate the month of recovery; ages at recovery are given in Tables 7 and 31. Also shown is one recovery (from Wigtownshire) of a bird ringed as adult. The approximate direction of the autumn movement from the Faeroes is indicated by the arrow.

Figure 9 The foreign recoveries of Norwegian Oystercatchers ringed either as pulli or on passage in autumn (partly after Holgersen 1962). There are a further nine recoveries south of the map: western France (8) and Spain (1). Numerals adjacent to symbols indicate the month of recovery; ages at recovery are given in Tables 7 and 32. The approximate direction of the main autumn movement from Norway is indicated by the arrow.

Figure 10 The foreign recoveries of Dutch Oystercatchers ringed as pulli. There are a further 52 recoveries extending southwards to Iberia and Morocco, and one from southern Finland. Numerals adjacent to the symbols indicate the month of recovery; ages at recovery are given in Tables 7 and 33. The direction of the autumn movement from Holland is indicated by the arrow.

Further information about the geographical origins of the Oystercatchers occurring around British coasts between autumn and spring is resulting from the M.A.F.F. project. Figures 11–14 show the distribution of marked Oystercatchers recorded on breeding grounds during the 1963–66 breeding seasons, and in many cases known definitely to be nesting. These records include both ringing recoveries and reliable sightings of colour-banded birds. Most of the latter were observed by the writer and his colleagues; full details are given in Appendix III. In addition to records from birds marked in the M.A.F.F. west-coast study areas several recoveries are included of Oystercatchers ringed in The Wash by local ringers (Figure 14), since these are the only such records from the east-coast wintering flocks.

The pattern of the records shows that on our western coasts the British wintering population of both immature and adult Oystercatchers is drawn from a very extensive northern breeding range. This embraces not only the small populations native to Wales, Ireland and northern England but also the much larger populations of Scotland, Iceland, the Faeroe Islands and Norway. However, the great regional variations in the chances of dead ringed Oystercatchers being found and reported (depending on such factors as the abundance of human and Oystercatcher populations) preclude accurate assessment of the relative contributions of different breeding areas to the British passage and wintering populations. Nevertheless, Scotland and the Faeroes clearly supply many birds, as is indicated also by the incidence in these two breeding areas of Oystercatchers colour-banded during autumn and winter in the M.A.F.F. study areas. Thus, in Scotland during the 1964 and 1965 breeding seasons 13 (1.1 per cent) of 1 132 breeding birds examined were seen to be wearing M.A.F.F. colour bands (A. J. Mercer; pers. obs.). In the Faeroe Islands 22 (1.4 per cent) of 1 581 breeders observed during the 1965 breeding season were found by the writer to be colour-banded. On the evidence of chick-ringing alone Iceland is another important source of winter visitors, for probably an Icelandic Oystercatcher stands a higher chance of being recovered if it dies as a youngster on British shores than if it dies as a breeding adult in its homeland. The relatively high number of recoveries in Norway, contrasting with none elsewhere in Scandinavia and only one each in Germany and Holland*, is in agreement with the interpretation of the Continental chick-ringing data. Moreover, considering the inaccessibility of so much of the Norwegian coastline, and consequently their poor recovery chances in that country, the fourteen British autumn- and winter-ringed Oystercatchers recently found in Norway suggest that many more Norwegian birds visit the British Isles than hitherto suspected.

The recoveries also show (and see Table 8) that Oystercatchers from widely separated breeding areas mix freely in the flocks in the British wintering area. No close correlation between any one breeding area and a particular wintering ground can be detected. The strong tendency for Icelandic–Faeroese Oystercatchers to be found most frequently on our western coasts probably reflects mainly the basic winter distribution of the species in this country (Dare 1966). The occurrences of Norwegian birds in these western areas are probably more significant, however, for they point to regular northern crossings of the North Sea, and subsequent passage down the Scottish coast and then by the overland route into the Irish Sea area, rather than to southern crossings via the Low Countries. Another feature of interest is that the Oystercatchers of the *Exe Estuary*, the main wintering place both in south-west England and along the English Channel coast, derive from northern breeding areas rather than from populations to the east. The origins of the large flocks frequenting The Wash and Thames Estuary approaches are still very imperfectly known. Apart from contributions from Norway, and from the few hundreds of pairs nesting locally, there are tenuous links with the Scottish, Danish and Dutch breeding populations. The isolation of these east-coast flocks from other important British wintering grounds and their proximity to the mainstream of Continental Oystercatcher migration call for an extensive ringing campaign in these haunts.

* Both quite possibly on passage (in March) to Norway by the eastern route, perhaps after a winter spent south of the British Isles.

Table 8 The international composition of some Oystercatcher flocks in the British Isles, as indicated by ringing recoveries on the breeding grounds

Ringing details			Number of recoveries on breeding grounds in			
Area	Date	Number ringed	Scotland	Faeroes	Iceland	Norway
Burry Inlet	11 November 1962	386	5	2	1	
Burry Inlet	5 September 1963	324	7			
Morecambe Bay	18 September 1963	738	6	5	2	3
Dee Estuary	28 January 1963	245	2	1	1	
Dee Estuary	15 November 1963	423	3	2		3

Notes
1. All birds ringed on a given date were captured from a single roosting flock by cannon-netting.
2. Six of those caught in *Morecambe Bay* on 18 September 1963, and which were also colour-banded, were observed breeding in 1964–65 near their place of capture on Walney Island.

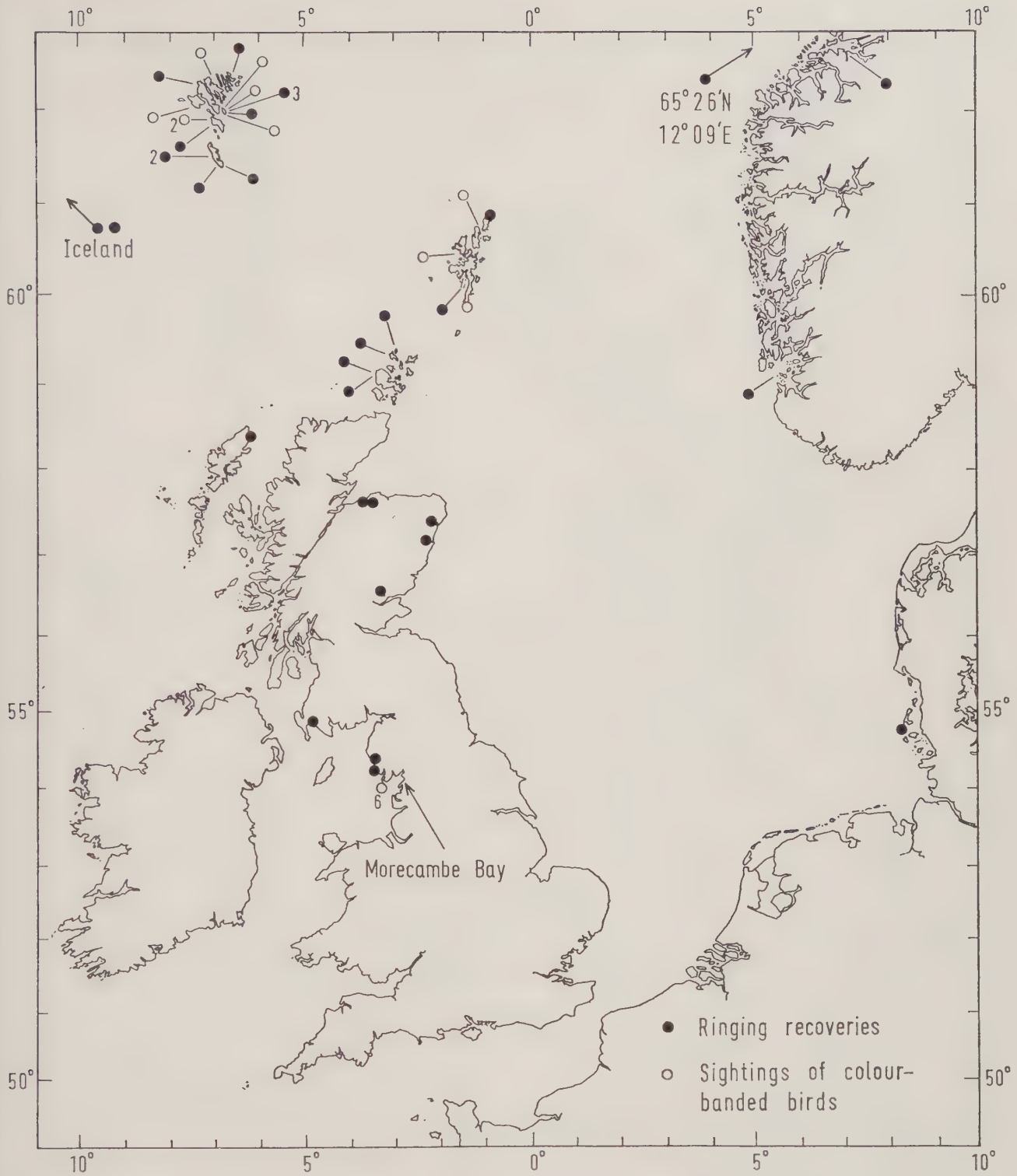

Figure 11 Recoveries and sight records on breeding grounds during 1963–66 of Oystercatchers ringed and colour-banded by M.A.F.F. in *Morecambe Bay*, Lancashire, between September and April (1962–64). Filled circles with pointers denote recoveries in Iceland and central Norway. Numerals indicate multiple records from a given locality. There are two earlier recoveries (in Iceland and Aberdeenshire) of birds from this bay which were transported and released in the Severn Estuary by E. J. M. Buxton.

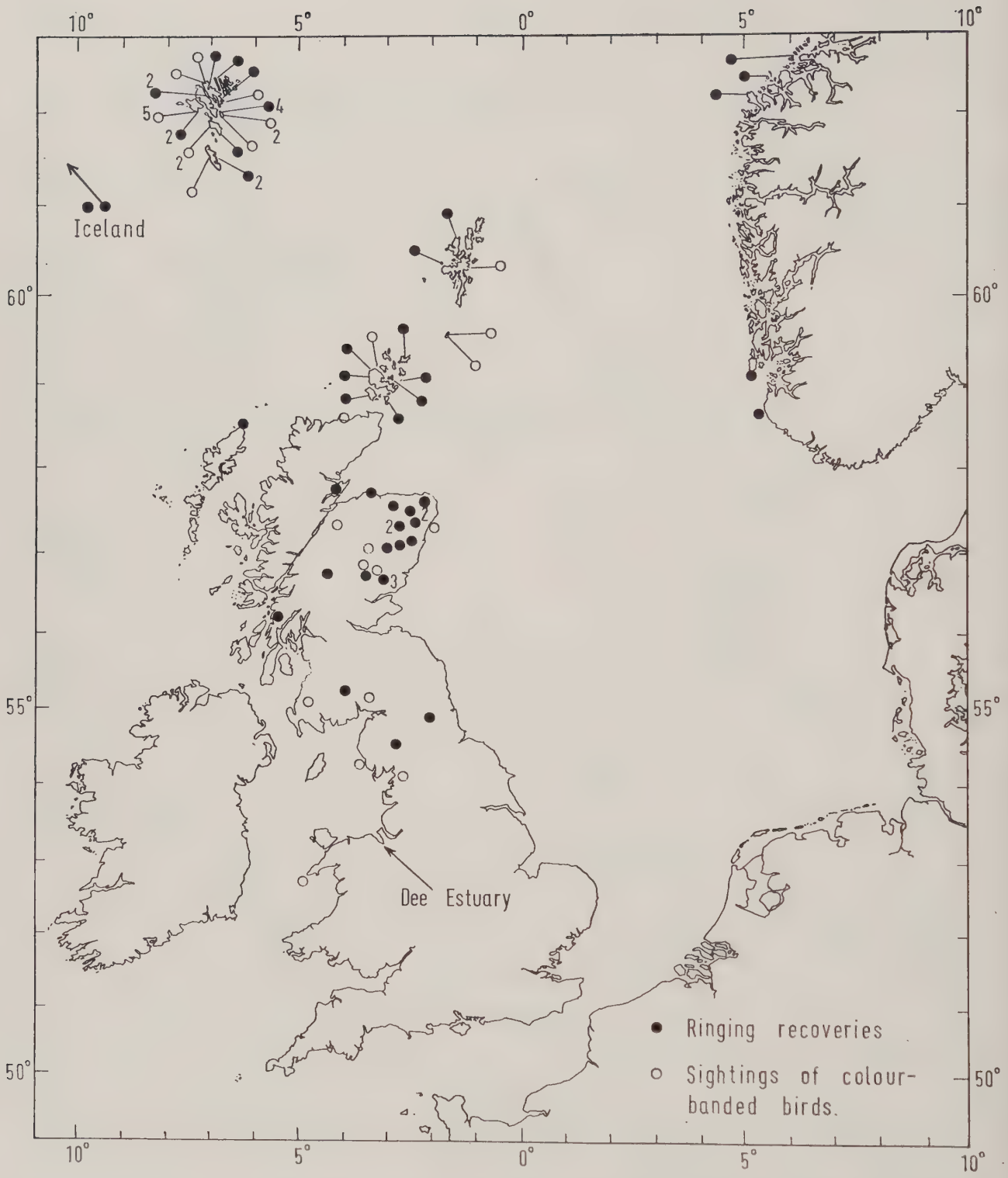

Figure 12 Recoveries and sight records on breeding grounds during 1963–66 of Oystercatchers ringed and colour-banded in the *Dee Estuary*, Cheshire/Flintshire, mainly between September and March (1961–64). The filled circles with pointer denote recoveries in Iceland. Numerals indicate multiple records from a given locality. All but four of the recoveries (Faeroes (2), Shetland (1) and Aberdeenshire (1)) refer to birds ringed under the M.A.F.F. project.

Figure 13 Recoveries and sight records on breeding grounds during 1963–66 of Oystercatchers ringed and colour-banded by M.A.F.F. in the *Burry Inlet*, South Wales, in autumn (1962–64). The filled circle with pointer denotes a recovery in Iceland.

Figure 14 Recoveries and sight records on breeding grounds during 1963–66 of Oystercatchers ringed and colour-banded by M.A.F.F. in: (A) *Conway Bay*, North Wales, in spring and autumn (1963–64); and (B) *Exe Estuary*, Devon, in autumn (1962–63). The filled and open circles with pointer denote one recovery and one sighting in Iceland. Also shown are six recoveries during 1961–66 of Oystercatchers ringed in the Wash in autumn (1960–64) by the Wash Wader Ringing Group and The Wildfowl Trust.

SECTION IV
MOVEMENTS IN BRITISH WINTER QUARTERS

Our present knowledge of the movements of Oystercatchers within the British Isles during the non-breeding season, and especially during winter, is still rather limited, despite the major contribution of the M.A.F.F. project. In this section the results of this, albeit short-term, investigation are examined in an attempt primarily to assess the extent to which Oystercatchers return each year to certain of the British wintering grounds, and also to reveal their principal migration routes to and from these winter quarters. Information is available from two main sources: (A) recoveries and recaptures of ringed birds, and (B) sight records of colour-banded birds.

RESULTS FROM RINGING

Introduction

Up to 31 March 1967 a total of 472 Oystercatchers, from those ringed by the M.A.F.F. in passage and wintering areas, had been recovered (309) or recaptured (163) either on migration or in their winter quarters—an overall return rate of nearly 9 per cent. These records form the basis for the present analysis and are listed in full in Appendix V.

Although, compared with many species, the Oystercatcher's recovery rate is encouragingly high, the data so far obtained are, unfortunately, inadequate for a detailed analysis of movement patterns. This is very largely because the numbers ringed in each study area represented only small samples of the Oystercatcher flocks present at any one time between autumn and spring, and also because catch-size and frequency of catches varied so much (Table 23, in Appendix I). Thus, in the *Burry Inlet* 797 birds were ringed, over three successive autumns, in an area supporting from 5 000 to 12 000 Oystercatchers daily between September and March. In *Morecambe Bay*, the 1 497 ringed during the course of $2\frac{1}{4}$ years were drawn from a population level of 10 000 to 20 000 Oystercatchers. In the *Exe Estuary* and *Conway Bay* even smaller proportions of the birds were ringed. In the *Dee Estuary*, on the other hand, an apparently far higher proportion of the population was ringed—2 723 in three years, in a haunt holding up to 3 000–5 000 Oystercatchers. Even so, the recoveries of *Dee*-ringed birds are still insufficient for many purposes.

In retrospect, it is clear that sufficient data would now be forthcoming only if 500–1 000 Oystercatchers could have been ringed every month, from autumn to spring, in each study area. The reasons for not attaining, or maintaining, such a high capture rate have already been noted (Section I). Analysis of the recoveries data is affected also by marked variations in the recovery rates from the different catches and study areas (Table 26, in Appendix I).

The recoveries during spring and autumn passage periods, and in British winter quarters, of birds ringed in the three most important study areas—i.e. *Burry Inlet*, *Morecambe Bay* and *Dee Estuary*—are shown in Figures 15–17. In this context, 'autumn' denotes the period mid-July through November, 'winter' comprises December and January only (when flocks seemed most settled), and 'spring' spans February to early May. These three periods are based on the known migration cycle described earlier (Section II). Records of ringed birds recaptured and released in wintering areas are not plotted on the maps, since nearly all were taken by the M.A.F.F., and their inclusion with dead recoveries would inevitably distort the overall recovery pattern. The significance of retraps will not be overlooked.

Figure 15 Recoveries on passage and in wintering areas during 1962–67 of Oystercatchers ringed by M.A.F.F. in the *Burry Inlet*, South Wales, in autumn (1962–64). The ringing area is enclosed by the broken lines. Numerals adjacent to symbols denote multiple recoveries. Retraps are omitted (see Table 9). There are 17 recoveries on breeding grounds (Figure 13).

Burry Inlet

Of 797 Oystercatchers ringed here, all in autumn, only 27 have so far been recovered in passage and wintering areas; 17 were adult when ringed, one was a first-year bird, and nine were older immatures, some of which probably became adult before recovery. The geographical, seasonal and annual distributions of these recoveries are shown in Figure 15 and Table 9. A further 17 birds were recovered on breeding grounds (Figure 13).

The recoveries, together with the recapture there of 25 birds in later autumns, show that some Oystercatchers were found again in the *Burry Inlet* from one to four years after ringing. These few ringing returns by themselves, however, do not indicate what proportion of Oystercatchers might have re-occurred in this estuary each year, but evidence from the colour-banding work suggests that it was the majority (see also Davidson 1967). The recoveries also trace the main migration route to and from *Burry Inlet*, and they further imply that few of the birds which reached the estuary in autumn passed on to the south. Although it has already been shown that there is a southerly emigration, via the western coasts, of British birds-of-the-year, few (c. 5 per cent) of the autumn-ringed Oystercatchers in the *Burry Inlet* were yearlings, and not all of these would necessarily have been British. Thus, the number of ringed birds which might have participated in such an onward, emigratory movement would have been very small. Most (c. 70 per cent) of the birds ringed were, in fact, adults. The recoveries pattern therefore tends to support the view, expressed earlier, that the great majority of adult Oystercatchers migrating southwards down the Irish Sea in autumn remain within the British Isles.

Table 9 The recovery pattern in passage and wintering areas of Oystercatchers ringed in the *Burry Inlet* (Figure 15)

Recovery pattern		Ringing periods				Totals
		Early autumn (August–September)		Late autumn (November)		
		Recoveries *Burry Inlet*	Elsewhere	Recoveries *Burry Inlet*	Elsewhere	
Season ringed	Autumn					0
	Winter	2	2	1		5
	Spring	2	1		1	4
After ringing	1st autumn	1	2	1		4
	1st winter			1	1	2
	1st spring	2		1	1	4
	2nd autumn	1		1	3	5
	2nd winter					0
	2nd spring					0
	3rd autumn				2	2
	3rd winter					0
	3rd spring					0
	4th autumn				1	1
Totals		8	5 = 13	5	9 = 14	27
Number ringed		378		419		797

Notes
1. The analysis covers all recoveries up to 31 March 1967.
2. Recoveries are not yet complete for the 3rd autumn period and later.
3. Excluded are the 26 birds recaptured in the *Burry Inlet* (25) and *Dee Estuary* (1), and distributed as follows: *Burry Inlet*—16 in the 1st autumn after ringing, 4 in the 3rd autumn, and 5 in the 4th autumn. *Dee Estuary*—one in the 1st autumn after ringing.
4. There are a further 17 recoveries on breeding grounds.

Figure 16 Recoveries on passage and in wintering areas during 1962–67 of Oystercatchers ringed by M.A.F.F. in *Morecambe Bay*, Lancashire, between September and April (1962–64). The ringing area is enclosed by the broken lines. Numerals adjacent to symbols denote multiple recoveries. Retraps are omitted (see Table 10). There are 32 recoveries on breeding grounds (Figure 11).

Table 10 The recovery pattern in passage and wintering areas of Oystercatchers ringed in *Morecambe Bay* (*MB*) (Figure 16)

Recovery pattern	Ringing periods								Totals
	Early autumn (September–October)		Late autumn (November)		Winter (December–January)		Spring (February–April)		
	Recoveries *MB*	Elsewhere	Recoveries *MB*	Elsewhere	Recoveries *MB*	Elsewhere	Recoveries *MB*	Elsewhere	
Season ringed									
Autumn	7								7
Winter	11	4	4		3				22
Spring	12	3	2	2	4		4	1	28
After ringing									
1st autumn	2		1						3
1st winter	1		2				1	1	5
1st spring	4	1	1	1		1	5		13
2nd autumn	3		1						4
2nd winter	4						2		6
2nd spring	1	1		1	1				4
3rd autumn	1	1					1		3
3rd winter			1						1
3rd spring	1				1	1		1	4
4th autumn					2				2
4th spring			1						1
Totals	47	10 = 57	13	4 = 17	11	2 = 13	13	3 = 16	103
Number ringed	1 040		156		151		150		1 497

Notes

1. The analysis covers all recoveries up to 31 March 1967.
2. Recoveries are not yet complete for the 3rd autumn period and later.
3. Excluded are the 18 birds recaptured in *Morecambe Bay* (14), *Dee Estuary* (3) and *Conway Bay* (1), and distributed as follows: *Morecambe Bay*—9 in the season of ringing, 4 in the 1st season after ringing, and one in the 2nd season after ringing. *Dee Estuary*—one in the autumn of the season of ringing, and two in the 1st autumn after ringing. *Conway Bay*—one in the 1st autumn after ringing.
4. A bird retrapped in Shetland in early September, on passage evidently, is also excluded.
5. There are a further 32 recoveries on breeding grounds.

Figure 17 Recoveries on passage and in wintering areas during 1962–67 of Oystercatchers ringed for M.A.F.F. in the *Dee Estuary*, Cheshire/Flintshire, between September and March (1961–64). The ringing area is enclosed by the broken lines. Numerals adjacent to symbols denote multiple recoveries. Retraps are omitted (see Table 11). There are 48 recoveries on breeding grounds (Figure 12).

Table 11 The recovery pattern in passage and wintering areas of Oystercatchers ringed in the *Dee Estuary* (Figure 17)

Recovery pattern	Ringing periods								Totals
	Early autumn (September–October)		Late autumn[a] (November)		Winter (December–January)		Spring (February–March)		
	Recoveries *Dee*	Elsewhere	Recoveries *Dee*	Elsewhere	Recoveries *Dee*	Elsewhere	Recoveries *Dee*	Elsewhere	
Season ringed									
Autumn	1		2						3
Winter	2	4	9	12	2	1			30
Spring	2	4	1	4	5	2	3		21
After ringing									
1st autumn	2		1		3	4	1	2	13
1st winter	1	3	1	1	3	12	3	2	26
1st spring	3	1	2	1	2	4	1	3	17
2nd autumn	1	1		2	1		1		6
2nd winter	1	2		1	1			2	7
2nd spring	2		1	2	4	5		1	15
3rd autumn			1	1		2	1	2	7
3rd winter					2	3	1	1	7
3rd spring		1		1	1	2	2	1	8
4th autumn					1			1	2
4th winter									0
4th spring		2			1	1			4
Totals	15	18 = 33	18	25 = 43	26	36 = 62	13	15 = 28	166
Number ringed	912		730		693		388		2 723

Notes

1. The analysis covers all recoveries notified up to 31 March 1967.
2. Recoveries from the September 1961 catch are included.
3. Recoveries are not yet complete for the 3rd autumn period and later.
4. Excluded are the 89 birds recaptured in the *Dee Estuary* (72), *Morecambe Bay* (11), *Burry Inlet* (5) and *Conway Bay* (1), and distributed as follows: *Dee Estuary*—10 in the season of ringing, 9 in 1st summer after ringing, 32 in 1st season after ringing, 13 in 2nd season, 7 in 3rd season, and one in 5th season after ringing. *Morecambe Bay*— 6 in 1st season after ringing, and 5 in 2nd season (comprising 7 autumn, 2 winter and 2 spring records). *Burry Inlet*—4 in 2nd autumn and one in 4th autumn after ringing. *Conway Bay*—one in 4th autumn after ringing.
5. There are a further 48 recoveries on breeding grounds.

Morecambe Bay

There are 103 recoveries in passage and wintering areas from the 1 497 Oystercatchers ringed in this bay between September and April (Figure 16, Table 10). Of these, 75 were ringed as adults, eight as first-year birds, and 20 as older immatures. A further 32 birds were recovered on breeding grounds (Figure 11).

Most recoveries occurred within *Morecambe Bay* itself. However, the recovery pattern is biased towards a higher recovery rate in the bay because of the active (authorized) shooting of Oystercatchers in parts of that area. Many of those recovered had, in fact, been shot—some within only a few days of ringing. On the other hand, this considerable shooting pressure has provided a useful series of recoveries suggesting that some Oystercatchers (adults and immatures) may have spent the entire autumn to spring period in this bay. Other birds were recovered (37) or recaptured (5) in the same area in later years, but the extent to which marked Oystercatchers returned annually to *Morecambe Bay* is indicated more clearly by the colour-banding results.

There is, unexpectedly, little evidence of marked onward movement to the south in autumn, considering that two-thirds (1 040 of 1 497) of the birds were ringed between September and November. This is shown also by a considerable mass of colour-banding data. There are only eight dead recoveries south of *Morecambe Bay*, and all but one had been ringed in autumn, as had two birds retrapped in the *Dee Estuary* and one in *Conway Bay*. A third bird recaptured in the *Dee* had been ringed early in spring (mid-February). Of the two winter recoveries in Scotland, the one on the coast of Angus was ringed as adult and, since it was found freshly dead in late January, it might well have been on very early northerly passage. The Orkney recovery is rather astonishing, however, since this bird—ringed as adult in mid-September and found in mid-December three months later—had flown more than 350 miles north during the same autumn or early part of the winter.

Dee Estuary

The study of Oystercatchers in this estuary will be described fully elsewhere by Dr. E. White, and the present account, which is little more than an interim summary, is given for comparison with the other study areas. There are now 166 recoveries and 89 retraps in passage and wintering areas from the 2 723 Oystercatchers ringed in the *Dee Estuary* between September and March (Figure 17, Table 11). Of those recovered, 112 were adults when ringed, 20 were first-year birds, and 34 were older immatures. A further 48 birds have been recovered on breeding grounds (Figure 12).

In contrast to Oystercatchers ringed in either *Morecambe Bay* or *Burry Inlet*, birds from the *Dee* were recovered over a much wider area, especially in winter, the recovery sites ranging mainly between south-west Scotland and the Bristol Channel. Many of the northerly records clearly occurred during peak migration periods, whilst some of the late winter records—i.e. those in the second half of January—may be ascribed to adults returning early to breeding grounds in Scotland and northern England. The relatively high winter recovery rate of *Dee*-ringed birds in *Morecambe Bay* was due not only to greater shooting activity in the latter area but also to a definite tendency for Oystercatchers to move northwards out of the *Dee* in autumn and early winter. Proof that such movements could extend as far north as the Firth of Clyde was furnished by both ringing recoveries (Table 12) and colour-banding observations. These northerly autumn flights from the *Dee Estuary* contrasted sharply with the few records of *Morecambe Bay*-ringed Oystercatchers visiting the *Dee* or the North Wales coast. A likely explanation of this behaviour is offered below. Some of the southerly recoveries, including one of the two from north-west France (ringed as a first-autumn bird), are explicable as onward movement by birds ringed in the *Dee* during the autumn passage. Others, however, had been ringed during a previous winter and cannot be similarly explained.

The interpretation of the recoveries pattern for *Dee*-ringed Oystercatchers is complicated considerably by the effects of the exceptionally cold 1962–63 winter; of the 1 081 Oystercatchers ringed in the *Dee* during all winter and spring trapping periods combined, no less than 90 per cent (906) were caught during that winter's severe weather, between late December 1962 and mid-February 1963. Most of these birds were therefore ringed precisely at a time when hardweather movements and influxes from other areas

could be expected and, in fact, the subsequent winter's recoveries from these catches strongly suggest that some of the Oystercatchers ringed in the *Dee* during the 1962–63 winter were, indeed, cold-weather immigrants. During the severe winter itself only six birds were recovered, of which five were in the *Dee* (and one on Anglesey), whereas 19 recoveries occurred in the following December–January period of the much milder 1963–64 winter. Of these 19, only four were in the *Dee* area, compared with 10 to the north (seven around *Morecambe Bay*, and one each in Durham, Solway Firth and south Lancashire), four to the west (in North Wales and Co. Wicklow), and one to the south (in South Wales). Unfortunately, only 39 Oystercatchers were ringed in *Morecambe Bay*, and none in the *Burry Inlet*, during the severe winter, so that comparative records for these two areas are lacking.

The severe winter has probably also had a more profound and long-term effect upon most Oystercatchers ringed in the *Dee Estuary* for this study. This is a consequence of the frost-devastation of the cockle beds which formed the Oystercatchers' main food supply in that area, for, since that event, a large decline in the numbers of Oystercatchers wintering in the *Dee* has occurred (E. White and J. C. Gittins, pers. comms.; Dare 1966). It seems likely, therefore, that many recoveries of *Dee*-ringed Oystercatchers in other areas, as well as the anomalous northerly movements in autumn, relate to birds which had redistributed themselves among adjacent haunts. Similar behaviour by *Morecambe Bay*-ringed Oystercatchers was not detected, presumably because the bulk of ringing in that area was not carried out until after the 1962–63 winter. Even then, in those parts of the bay where cockle stocks—like those of the *Dee Estuary*—had 'crashed', ringing did not begin in the 1963–64 season until October; and, by that time, it was clear from field observations that the main associated fall in Oystercatcher numbers had already occurred. Although cockles have since remained very scarce in *Morecambe Bay* the recoveries of Oystercatchers ringed, since the 'crash', in former cockle areas on the Flookburgh sands, have shown little or no tendency for birds to move further than the alternative feeding areas afforded by the coastal fields and numerous mussel beds around the bay. The evidence from the colour-banding work is consistent with this interpretation. Despite all these complicating factors there is no evidence from the *Dee* recoveries and retrap data of any very radical change of winter quarters. Numbers of *Dee*-ringed Oystercatchers continued to be found again in that estuary and its environs for at least four years after ringing. In contrast, away from the adjacent haunts in Lancashire and North Wales, *Dee* Oystercatchers were recovered in winter rarely in Ireland, and seldom in Scotland (and then only in the extreme south-west), whilst none has yet been found anywhere down the long east and south coasts of England between Durham and Devon.

Table 12 Recoveries of Oystercatchers ringed in autumn in the *Dee Estuary* which demonstrate northerly movements in the same autumn or early that winter

Ring number	Date		Recovery area	Movement	
	Ringed	Recovered		Miles	Direction
AT 88751	17 September 1963	30 December 1963	Morecambe Bay	40	N
SS 14791	22 October 1964	12 January 1965	Morecambe Bay	50	NNE
AT 88861	1 November 1963	29 December 1963	Morecambe Bay	58	NNE
AT 88996	1 November 1963	5 January 1964	Morecambe Bay	58	NNE
SS 15681	6 November 1964	8 January 1965	Isle of Arran, Scotland	170	NW
SS 14329	15 November 1963	29 December 1963 *approx.*	Morecambe Bay	40	N
SS 14345	15 November 1963	27 December 1963	Morecambe Bay	53	NNE
SS 14439	15 November 1963	26 December 1963	Blackpool, Lancashire	34	NNE

Conway Bay

Of 316 Oystercatchers ringed at Llanfairfechan in autumn and spring only five have so far been recovered in passage and wintering areas. Three were found where ringed—an immature in the second spring after ringing, an adult in the second autumn, and an adult in the second winter—, one was found on Anglesey in spring, whilst another adult was recovered in the Firth of Forth in August, evidently when on southerly passage from its breeding grounds (Appendix V). Twenty-nine birds have been retrapped. Of five ringed in spring, four were retaken where ringed and one in the *Dee Estuary*, all two autumns later. Of 24 ringed in autumn, 23 were recaptured at the same roosts (3 later that autumn, and 20 in the second autumn) and one was trapped in the *Dee Estuary* two months after ringing. There were, in addition, seven recoveries on breeding grounds (Figure 14).

Exe Estuary

There are eight recoveries in passage and wintering areas from the 94 Oystercatchers ringed here in autumn (Appendix V). One was recovered in the Severn Estuary (Somerset) in the second autumn after ringing, when presumably on passage south, whilst five were found in the *Exe* during the winter and early spring of the season ringed. The remaining two were picked up nearby, in Ladram Bay and the Teign Estuary, in the autumn and winter of the season ringed. A further three recoveries on breeding grounds are shown in Figure 14.

RESULTS FROM COLOUR-BANDING

Introduction

Requirements and Problems At the outset of the M.A.F.F. programme it was considered that whereas ringing would probably reveal the seasonal migration patterns of Oystercatchers between their breeding and wintering areas, the local—and probably more complex—movements between particular feeding sites within the individual winter quarters themselves would be more suitable for investigation by means of colour-banding. Complete success with this work, however, would depend upon the ability to detect any significant changes which might occur in the proportions of marked birds in flocks. To do this, certain fundamental requirements would need to be satisfied; these were: (i) birds should be marked in batches which comprise random samples of the given population, and should be caught when dispersed on the feeding grounds rather than at the roosting assemblies; (ii) in each study area, either a similar number, or a similar proportion, of the birds should be marked during the same period; (iii) subsequent observations on the incidence of marked birds should be directed towards feeding flocks; (iv) the distribution of visual sampling effort should be proportional to the number of birds in the different areas; and (v) some observations in other haunts should be carried out to check on possible dispersal of marked birds to non-study areas.

For various reasons, only the last requirement was fulfilled in practice. Oystercatchers cannot be caught in large numbers when actually feeding. All catches, therefore, had to be made at the roosting sites where, however, operational difficulties (see Section I) prevented catch-size and frequency from conforming to any desired programme. Consequently, the total numbers of Oystercatchers marked differed enormously between study areas, and there were very large seasonal and annual variations (Table 23 in Appendix I). Only a small proportion of study area populations was eventually colour-banded. One basic problem, arising from the methods of trapping, is the extent to which Oystercatchers might have been grouped non-randomly at roosts. Unfortunately, nothing is known about the social organization of Oystercatcher flocks, nor of the spatial distribution within a roost when the members are drawn from several different feeding sites. The risk of bias from such possible behaviour is likely to be greatest in those areas where only few catches were made. Problems were also encountered with the observational sampling requirements, for favourable observation periods tended to be so restricted by general environmental factors, as well as by other programme commitments, that regular random sampling was not generally feasible.

Methods of observation When determining, by sample counts, the proportion of colour-banded Oystercatchers in any flock only birds clearly showing both legs were counted, for since many Oystercatchers had been banded on each tarsus a sight of both legs was often essential to ascertain the area and date of marking. Indeterminate sight records were discarded. Colour-bands could be observed most readily on birds feeding; they were most difficult to discern when birds were packed together at a roost and very often standing on only one leg. However, due to adverse terrain it was not always practicable to sample feeding flocks, and so other procedures were adopted. In the *Burry Inlet* area, where most samples were from large sand-feeding flocks, birds were usually observed at short range from a Land-Rover (Davidson 1967). In the *Dee Estuary*, feeding flocks were intensively examined, but chiefly without the aid of such a convenient mobile hide. In *Morecambe* and *Conway Bays*, several methods were used widely: on firm sand-flats and mussel scars, and in coastal fields, feeding birds and resting flocks were regularly scrutinized at close quarters from a Land-Rover; on unsuitable shores, however, flocks could not be observed until they gathered on the upper beach immediately prior to forming a roost. Occasionally, observations could be made only at the roost itself.

For the above reasons, it is evident that adherence to a prescribed random sampling routine was not practicable. The following observational procedure was therefore substituted. A flock was first examined carefully and the ratio of colour-banded to unmarked birds, among that portion of the flock clearly showing both legs, was noted. In all but very small flocks it is seldom possible to examine more than a

fraction of the birds at any one time, because many individuals are either partially obscured by others, hidden by uneven terrain, or resting or hopping on one leg. To overcome these problems, flocks of active Oystercatchers were usually re-examined, several times if necessary (at 5–10 minute intervals), until it was judged that a large proportion of the birds had been checked. In this way, although because of intermingling many individuals would unavoidably have been recorded more than once, better coverage could be achieved and a reasonable estimate obtained for the proportion of birds in the flock that were colour-banded. The repetitive nature of the observations accounts for the fact that, in the following tables, seasonal totals for numbers of birds examined and marked birds seen often far exceed the actual population size present in an area on any occasion.

In some places observational coverage was increased by examining flocks two or more times each month, but similar sampling frequencies for all the (widely separated) study areas was beyond our capabilities. Overall visual sampling efforts, therefore, varied widely between the different study areas, being greatest in the *Dee Estuary* and *Conway Bay*, and least in the *Exe Estuary*. Oystercatcher flocks in many non-banding areas were also examined, and special surveys were conducted in the main Scottish and Irish haunts as well as in parts of eastern and southern England (Table 15). It is unfortunate, however, that the Solway Firth—the most important Oystercatcher haunt north of *Morecambe Bay*, and indeed one of the four major wintering grounds in the British Isles—could not be surveyed periodically.

A large quantity of observational records has now been amassed, covering almost the entire range of environmental conditions experienced during the project. Although, clearly, these data are not amenable to statistical evaluation, they are nevertheless considered worth presenting, because the behaviour they indicate is not only consistent and credible but it also accords with the ringing results in most respects, and because so far as is known this is the first large-scale quantitative colour-banding study of a wader species outside the breeding season.

Methods of analysis The extent to which Oystercatchers colour-banded in each study area mingled with flocks in the other four study areas and elsewhere, or, conversely, remained apart in their respective marking areas, can be examined in two ways. One method (A) is to indicate the degree of mixing only among the study (banding) areas themselves, whereas the other method (B) is to evaluate for each banding area the numerical and geographical patterns of any dispersal of its marked birds.

Observational data were gathered throughout the three autumn-spring periods (i.e. approximately late July to late March) of 1964–65, 1965–66 and 1966–67. These periods will be referred to, in the present context, as 'observation seasons'; and birds banded during an autumn–spring period will here be considered as one 'winter-class'. The last Oystercatchers to be colour-banded were caught during the 1964 autumn, and any observations of these birds in the 1964–65 season are excluded from the present analyses. All data used, therefore, relate only to winter-classes preceding the actual season of observation. Thus, the data of the 1964–65 observation season refer to birds only from the 1962–63 and 1963–64 winter classes, whilst the data of the 1965–66 and 1966–67 observation seasons include birds from the 1964–65 winter-class as well. The main reason for choosing this method is that, since approximately three-quarters of the Oystercatchers were adult when banded, most records of birds seen in their area of banding during a later observation season can be assumed to indicate a return (however temporary) to the original capture area after an absence for breeding. Moreover, of those birds which were immature when banded most would undoubtedly have become adult, and bred at least once, before one or other of the three observation seasons. Therefore, any bias possibly arising from the suspected tendency for immatures to be relatively sedentary in a study area from one year to the next (Section II) should not seriously affect the analyses.

Interchanges among banding areas

The amount of interchange between the banding areas, during the migration and winter periods, is assessed by Method A. This compares for each area the observed proportions in which colour-banded Oystercatchers of different origins occur with the proportions to be expected with random intermingling. For this, the only field data required are on the observed relative abundance of the different groups of colour-banded birds. Estimates of actual numbers present are not needed; nor are observations in other (non-study) areas essential.

Basic field data for each study area are given in Table 13. The records are, unfortunately, spread too unevenly through the observation seasons for analysis on a monthly or quarterly basis for all study areas. They can, however, be evaluated (though only rather crudely) when summed for each complete observation season. For every study area and observation season the colour-band sightings are sub-divided according to their area of origin and winter-class. The relative abundance of each group is then expressed as a percentage of the total number of colour-banded birds, from all sources, seen that season in the particular study area. Because the numbers banded in each area were so very dissimilar, these percentage values are not directly comparable unless they can be related to the original proportions in which the Oystercatchers were banded. To do this, the observed relative abundances in each area of all winter-classes from every study area are first summed and then converted to ratios, which are finally expressed on a common basis—per 100 birds banded in each area (Table 14). These adjusted values of relative abundance may be regarded as 'mixing indices', and they can be expressed diagrammatically (Figures 18 and 19). It will be appreciated that the values can be compared either horizontally or vertically, but not diagonally. The 1966–67 data are not illustrated, but reference to Table 13 shows that their pattern differed very little from that of the two earlier observation seasons.

If, during any one observation season, random intermingling of colour-banded birds had occurred between, though not necessarily confined to, the study areas, the different area codes should then have been recorded everywhere in proportions approximating to those in which they were banded originally. The values of the mixing indices would then have been the same in all areas. On the other hand, consistent wide departures of the observed proportions from the originals, reflected by a wide scatter in the mixing indices, would be taken to indicate non-random movements. Any discrepancies likely to arise from mortality will be small unless there are marked annual and area differences in survival. Since no allowance can be made for these unknown quantities, and because they are likely to be unimportant compared with sampling errors, mortality effects are ignored.

The results from all three observation seasons are essentially similar. The adjusted data suggest that movements of colour-banded Oystercatchers between the five banding areas were distinctly non-random, and that interchanges were generally on a small scale. In every area, except the *Dee Estuary*, there was a marked tendency for birds to re-occur relatively more often in their respective banding areas than anywhere else. Most of the interchanges recorded resulted from *Dee* birds moving to adjacent haunts. Discussion of the movements from the individual banding areas will, however, be deferred until the dispersal data have been presented.

Table 13 The origins and relative abundance of the colour-banded Oystercatchers recorded in each study area during the three observation seasons 1964–65, 1965–66 and 1966–67

Study area	Observation season	Total birds examined	Total colour-banded birds seen	Marking areas and winter classes of birds seen							
				Morecambe Bay 1962–63		1963–64		1964–65		Total	
				No	%	No	%	No	%	No	%
Morecambe Bay	1964–65	16 464	245	16	*6.5*	161	*65.7*	–	–	177	*72.2*
	1965–66	13 058	174	24	*13.8*	63	*36.2*	27	*15.5*	114	*65.5*
	1966–67	8 875	151	22	*14.6*	20	*13.2*	57	*37.7*	99	*65.6*
Dee Estuary	1964–65	16 655	296	0	*0*	3	*1.0*	–	–	3	*1.0*
	1965–66	31 580	584	3	*0.5*	0	*0*	0	*0*	3	*0.5*
	1966–67	4 563	60	0	*0*	0	*0*	0	*0*	0	*0*
Conway Bay	1964–65	16 409	88	1	*1.1*	3	*3.4*	–	–	4	*4.5*
	1965–66	24 537	743	2	*0.3*	2	*0.3*	1	*0.1*	5	*0.7*
	1966–67	20 703	359	2	*0.6*	1	*0.3*	2	*0.6*	5	*1.4*
Burry Inlet	1964–65	9 400	113	0	*0*	0	*0*	–	–	0	*0*
	1965–66	10 351	92	0	*0*	0	*0*	0	*0*	0	*0*
	1966–67	16 959	134	0	*0*	0	*0*	1	*0.8*	1	*0.7*
Exe Estuary	1964–65	766	23	0	*0*	0	*0*	–	–	0	*0*
	1965–66	1 766	41	0	*0*	0	*0*	0	*0*	0	*0*
	1966–67	972	24	0	*0*	0	*0*	0	*0*	0	*0*

Notes
1. *Burry Inlet* here includes also the important estuarine complex of the Taf, Towy and Gwendraeth rivers, c. 10 miles away.
2. *Exe Estuary* observations include a small number from the nearby Teign Estuary, 5 miles away.

Table 14 The origins and relative abundance of the colour-banded Oystercatchers recorded in each study area during the 1964–65, 1965–66 and 1966–67 observation seasons: expressed relative to the proportions in which originally marked, for the derivation of mixing indices (Figures 18 and 19)

Observation/ study area	Number of birds colour-banded before relevant observation season*		Marking areas and ratios of relative abundance of colour-banded birds observed									
			Morecambe Bay		*Dee Estuary*		*Conway Bay*		*Burry Inlet*		*Exe Estuary*	
			See note 3 R	MI	R	MI	R	MI	R	MI	R	MI
	1964–65 observation season											
Morecambe Bay	648	*0.22*	0.72	0.111	0.28	0.014			0	0	0	0
Dee Estuary	1 934	*0.66*	0.01	0.002	0.99	0.051			0	0	0	0
Conway Bay	0	*0*	0.05	0.008	0.95	0.049			0	0	0	0
Burry Inlet	240	*0.08*	0	0	0.05	0.003			0.96	0.400	0	0
Exe Estuary	94	*0.03*	0	0	0.04	0.002			0	0	0.96	1.021
	1965–66 observation season											
Morecambe Bay	874	*0.23*	0.66	0.076	0.33	0.015	0.01	0.004	0	0	0	0
Dee Estuary	2 261	*0.60*	<0.01	0.001	0.98	0.043	0.01	0.004	0	0	0	0
Conway Bay	277	*0.07*	0.01	0.001	0.15	0.007	0.84	0.303	0.001	<0.001	0.001	0.001
Burry Inlet	292	*0.08*	0	0	0.12	0.005	0.02	0.007	0.86	0.295	0	0
Exe Estuary	94	*0.02*	0	0	0	0	0	0	0	0	1.00	1.064

Table 13—continued

Dee Estuary						*Conway Bay*		*Burry Inlet*				*Exe Estuary*					
1962–63		1963–64		1964–65		Total		1964–65		1963–64		1964–65		Total		1962–63		1963–64		Total	
No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
28	*11.4*	40	*16.3*	–	–	68	*27.7*	–	–	0	*0*	–	–	0	*0*	0	*0*	0	*0*	0	*0*
27	*15.5*	26	*14.9*	5	*2.9*	58	*33.3*	2	*1.1*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
19	*12.6*	26	*17.2*	5	*3.3*	50	*33.1*	0	*0*	2	*1.3*	0	*0*	2	*1.3*	0	*0*	0	*0*	0	*0*
148	*50.0*	145	*49.0*	–	–	293	*99.0*	–	–	0	*0*	–	–	0	*0*	0	*0*	0	*0*	0	*0*
257	*44.0*	219	*37.5*	98	*16.8*	574	*98.3*	7	*1.2*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
38	*63.3*	3	*5.0*	18	*30.0*	59	*98.3*	1	*1.7*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
64	*72.7*	20	*22.7*	–	–	84	*95.5*	–	–	0	*0*	–	–	0	*0*	0	*0*	0	*0*	0	*0*
43	*5.8*	49	*6.6*	19	*2.6*	111	*14.9*	625	*84.1*	1	*0.1*	0	*0*	1	*0.1*	0	*0*	1	*0.1*	1	*0.1*
21	*5.8*	19	*5.3*	23	*6.4*	63	*17.5*	291	*81.1*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
2	*1.8*	3	*2.7*	–	–	5	*4.5*	–	–	108	*95.6*	–	–	108	*95.6*	0	*0*	0	*0*	0	*0*
5	*5.4*	2	*2.2*	4	*4.3*	11	*11.9*	2	*2.2*	71	*77.2*	8	*8.7*	79	*85.9*	0	*0*	0	*0*	0	*0*
10	*7.5*	6	*4.5*	1	*0.8*	17	*12.7*	5	*3.7*	70	*52.2*	41	*30.6*	111	*82.8*	0	*0*	0	*0*	0	*0*
0	*0*	1	*4.3*	–	–	1	*4.3*	–	–	0	*0*	–	–	0	*0*	7	*30.4*	15	*65.2*	22	*95.6*
0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	10	*24.4*	31	*75.6*	41	*100.0*
2	*8.3*	0	*0*	0	*0*	2	*8.3*	0	*0*	0	*0*	0	*0*	0	*0*	–	–	–	–	22	*91.7*

. The percentages shown are, for each column, the numbers in that column as percentages of the number on the same ine in the column: Total colour-banded birds seen.

Table 14—continued

)bservation/ tudy area	Number of birds colour-banded before relevant observation season*		Marking areas and ratios of relative abundance of colour-banded birds observed									
			Morecambe Bay		*Dee Estuary*		*Conway Bay*		*Burry Inlet*		*Exe Estuary*	
			See note 3 R	MI	R	MI	R	MI	R	MI	R	MI
	1966–67 observation season											
Morecambe Bay	874	*0.23*	0.66	0.076	0.33	0.015	0	0	0.01	0.003	0	0
Dee Estuary	2 261	*0.60*	0	0	0.99	0.044	0.01	0.004	0	0	0	0
Conway Bay	277	*0.07*	0.01	0.001	0.18	0.008	0.81	0.292	0	0	0	0
Burry Inlet	292	*0.08*	<0.01	<0.001	0.13	0.006	0.04	0.014	0.83	0.284	0	0
Exe Estuary	94	*0.02*	0	0	0.08	0.004	0	0	0	0	0.92	0.979

otes

Burry Inlet here includes also the important estuarine complex of the Taf, Towy and Gwendraeth rivers, c. 10 miles way.

Exe Estuary observations include a small number of records from the nearby Teign Estuary, 5 miles away.

For derivation of (R) Ratios of Relative Abundance and (MI) Mixing Indices see text, p. 47, and Table 13

The figures in italics show the numbers as proportions of the total up to the season.

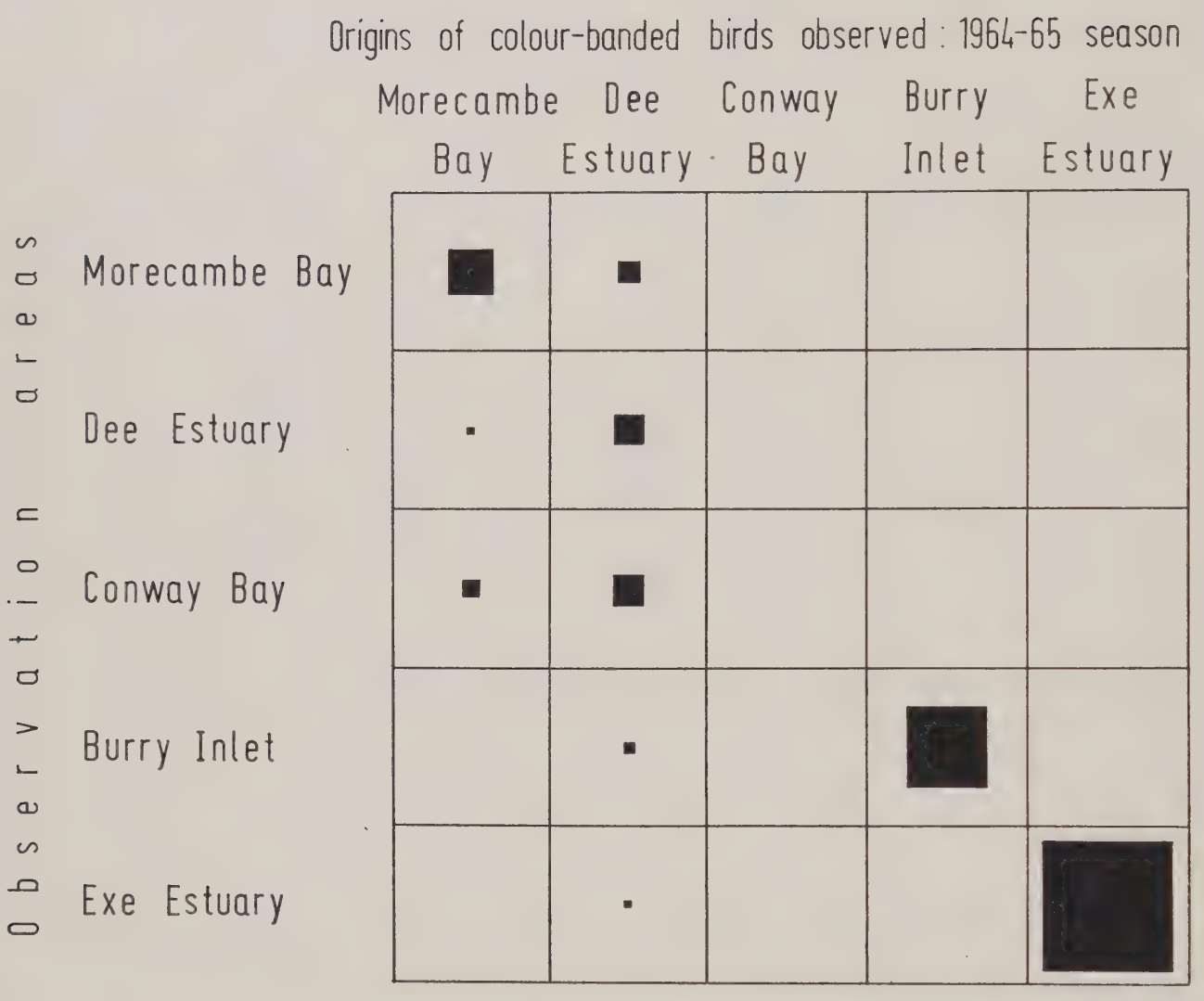

Figure 18 Diagram to indicate the extent of movements between the study (wintering) areas by colour-banded Oystercatchers during the 1964–65 observation season. The filled squares represent the indices of mixing for birds banded in each study area (see Table 14). When compared either horizontally or vertically, but not diagonally, the relative sizes of the squares and their distribution on the grid indicate the extent of non-random mixing between study areas. Random intermingling would be indicated when all subdivisions of the grid contained squares of approximately equal size. (Birds banded in *Conway Bay* were not eligible for analysis in the 1964–65 season).

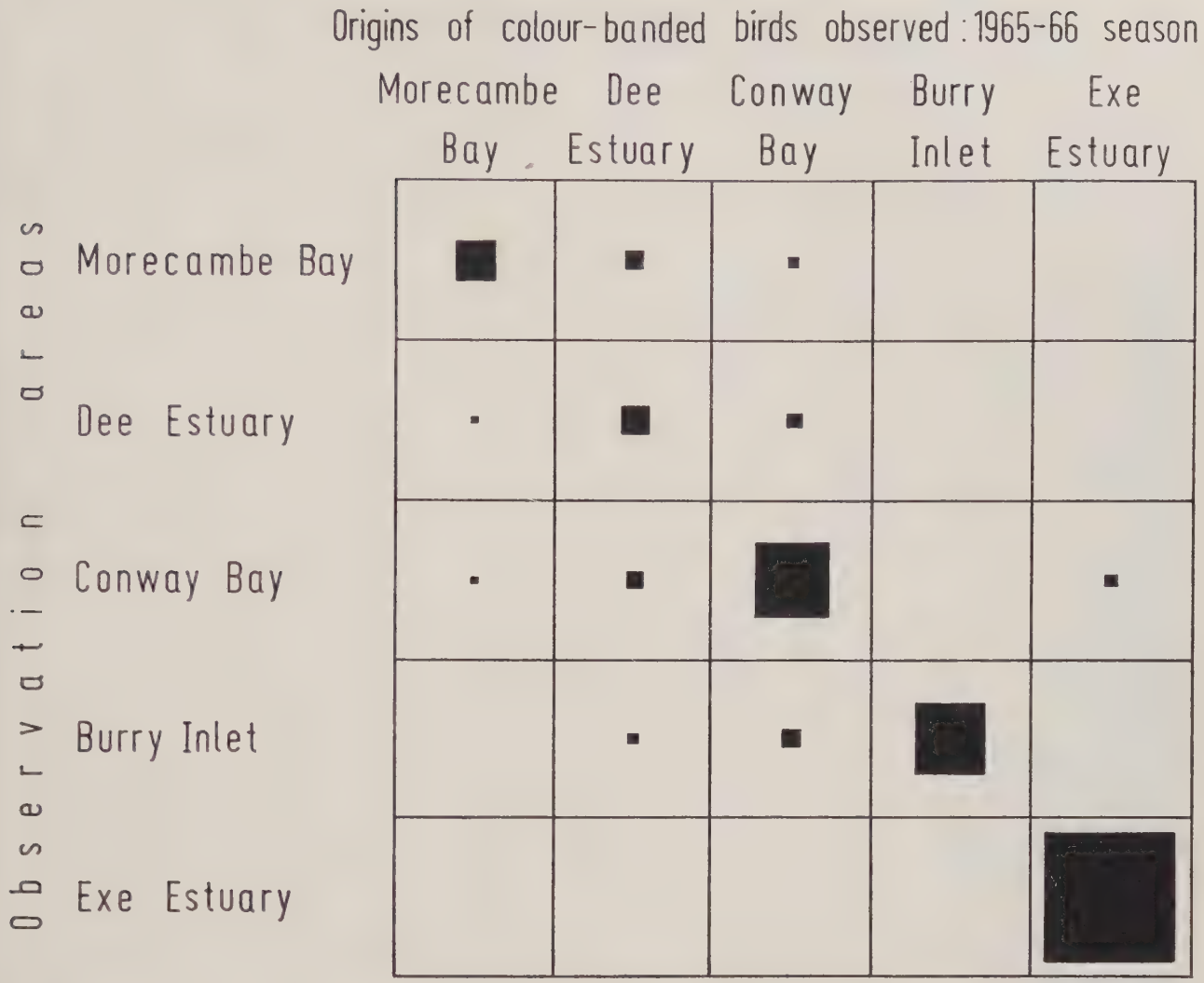

Figure 19 Diagram to indicate the extent of movements between the study areas by colour-banded Oystercatchers during the 1965–66 observation season. For explanation, see Figure 18 and Table 14.

Table 15 The numbers and origins of colour-banded Oystercatchers recorded in non-study areas surveyed during the three observation seasons 1964–65, 1965–66 and 1966–67

Areas surveyed	Date	Birds present	Birds examined	Colour-banded birds seen	Origins of birds seen†				
					MB	*DE*	*CB*	*BI*	*EE*
Scotland									
Moray Firth	26–29 Jan 1965	5 700	908	0					
East coast	1–5 Feb 1965	5 750	1 197	0					
South-west coast	22–24 Jan 1965	2 250	1 150	0					
Solway Firth	18–21 Jan 1965	17 000	3 078	5		5			
Ireland									
North and east coasts	15–19 Dec 1965	6 500	965	0					
South and west coasts	6–14 Dec 1965	2 600	318	0					
Wales									
Colwyn Bay	*1964–65	250–750	2 725	28		28			
Colwyn Bay	2 Feb 1966	250–750	373	7		7			
Colwyn Bay	*1966–67	250–750	1 892	23		23			
Anglesey	*1964–65	1–2 000	3 872	31	3	24		3	1
Anglesey	*1965–66	1–2 000	2 451	18	3	9	3	3	
Anglesey	*1966–67	1–2 000	5 301	4	1	3			
Cardigan Bay	27 Nov 1964	800	192	2				2	
Cardigan Bay	6 Jan 1965	300	110	0					
Cardigan Bay	24–25 Nov 1965	530	420	4		3		1	
Cardigan Bay	10–11 Oct 1966	1 100	828	1		1			
Cardigan Bay	10–13 Jan 1967	580	478	0					
Cardigan Bay	26 Jan 1967	180	143	0					
Cardigan Bay	1 Mar 1967	120	102	0					
Pembrokeshire (south)	17 Dec 1964	300	200	0					
Pembrokeshire (south)	4–6 Jan 1965	400	69	0					
Pembrokeshire (south)	14 Oct 1966	305	234	2				2	
Pembrokeshire (south)	13 Jan 1967	145	125	0					
England									
Lancashire: Ribble Estuary	21–22 Oct 1965	500	54	1		1			
Lancashire: Ribble Estuary	27 Jan 1966	900	611	5		5			
North Devon: Taw Estuary	18 Dec 1964	700	499	1		1			
North Devon: Taw Estuary	27 Feb 1965	300	56	0					
North Devon: Taw Estuary	22 Oct 1965	700	658	1		1			
North Devon: Taw Estuary	14 Jan 1967	450	200	0					
Somerset	21–22 Dec 1964	150	60	0					
Dorset to Kent	22–25 Feb 1965	1 500	427	0					
Essex: Foulness	7 Jan 1965	3 000	300	0					
Norfolk: Scolt-Wells Harbours	20 Feb 1965	1 050	648	0					

1. * Areas surveyed regularly throughout the season.
2. Cardigan Bay includes Dovey and Mawddach Estuaries, Traeth Bach and the Towyn and Aberaeron shores.
3. Records of birds banded in autumn 1964 and seen during the same (i.e. 1964–65) season are omitted.
4. † *MB=Morecambe Bay, DE=Dee Estuary, CB=Conway Bay, BI=Burry Inlet, EE=Exe Estuary.*

Dispersal patterns from the banding areas

To express quantitatively (by Method B) the winter dispersal patterns of marked birds from colour-banding areas, basic data are needed on Oystercatcher numbers and distribution, and on the frequency of occurrence of marked birds in the various haunts. Ideally, such information should be gathered synchronously each month (from autumn through spring) for all major wintering and passage haunts in the British Isles—clearly a virtually impossible task. In reality, it proved possible to cover at all regularly only the eastern shores of the Irish Sea (from *Morecambe Bay* to Cardigan Bay), the South Wales coast (Pembrokeshire to Gower), and the principal estuaries of north and south Devon. Even then, observational coverage was often incomplete, because monthly surveys of every selected haunt were beyond our resources. Nevertheless, within the limitations of the fieldwork, it will become apparent that monitoring the dispersal of marked birds for even a limited distance has revealed several striking features of wintering behaviour.

Basic field data and derived estimates of the numerical abundance of colour-banded Oystercatchers in each area are tabulated and explained in Appendix VII. The analysis involves, first, estimating the population size (P) of Oystercatchers in an area and, by visual sampling, the incidence of colour-banded birds from each banding area in that population. The frequency (F) of banded Oystercatchers in each place is then expressed as the number per 1 000 birds of population. Assuming a random distribution of marked birds in a population at each time of observation (for which the evidence is inconclusive), or random visual sampling (certainly not always achieved), the product of F and P gives an estimate of the number (N) of banded birds present in the area on that occasion. If observations are repeated often enough throughout the autumn, winter and spring of each year, seasonal and annual changes in the distribution and numbers of marked birds should be detectable. Although frequent sampling was not always possible, the data obtained nevertheless suffice to compare at least general levels of abundance between localities.

Since the main aim of the colour-banding project was to measure the extent to which Oystercatchers might return annually to certain areas, the above estimates of abundance should be expressed relative to not only the numbers originally marked but also those still alive at a later date. Whereas the former calculation is straightforward, the latter requires knowledge of the mortality rates of marked birds during the study. No firm estimate of mortality is yet available, but preliminary analysis of the M.A.F.F. recoveries data suggests an overall mortality rate during the four years, for all age groups combined (i.e. adults, first-year and older immatures), of the order of 25 per cent (Dare and Hepper, in preparation). A rough correction for mortality is therefore made by calculating, on the basis of a 25 per cent mean annual mortality rate, the numbers of marked Oystercatchers which would be alive in successive winters after banding (Appendix VI). Values of N are then expressed in terms of the estimated numbers surviving to the mid-point (December 1) of each observation season. Though annual and local differences in mortality rate could well have occurred during this study, the number of dead recoveries is inadequate for the assessment of such variations; but these, in any case, are probably too small (compared with known sampling errors) to affect the general picture.

Finally, in Tables 16–19 the data from Appendix VII are re-arranged to show more clearly the dispersal patterns of the Oystercatchers colour-banded in the four main study areas. These tables record the annual, seasonal and local abundance of marked birds in all the main wintering haunts from Lancashire southwards to Devon. An indication of their occurrence elsewhere—in Scotland, Ireland and south-east England—is afforded by the survey figures in Table 15. The occasional brief surveys which were made of nearly all the main wintering haunts elsewhere in the British Isles gave no reason to suppose that many colour-banded Oystercatchers had dispersed very widely away from their banding areas. Dispersal in the vicinity of the marking areas will now be discussed.

Dispersal from Morecambe Bay The colour-banding data (Table 16) agree closely with the pattern of the ringing recoveries. Usually, many Oystercatchers banded here were present in the local flocks, but they were scarce further south even though most (65–70 per cent) had been marked in autumn.

The numbers present again in the bay were apparently much greater each autumn, at the time of peak annual population size, than during the winter and spring. Unfortunately, due to sampling deficiencies and the problem of accurately assessing the size of the large and seasonally very variable Oystercatcher population in *Morecambe Bay*, the local estimates of banded birds can be given only within wide limits. If, however, these incomplete data do reflect the real pattern, and the autumn maximum with a subsequent large fall in numbers is due to southerly passage, then the scarcity of sightings (and also of dead recoveries—Figure 16) to the south is puzzling. For large movements to wintering areas seldom or never covered by our observations, e.g. southern Ireland or France, are not suggested by the ringing returns. Moreover, even with a mortality rate markedly higher than 25 per cent per annum, there would still seem to be a large proportion of *Morecambe Bay* birds whose subsequent whereabouts could not be traced.

As Table 16 shows, *Morecambe Bay*-banded Oystercatchers were scarce only 50–70 miles to the south, in the well-watched *Dee Estuary* and North Wales haunts, and still rarer in South Wales. Those sighted along the North Wales coast had been banded in all months between September and March. The pattern during the earlier 1963–64 season was very similar. In addition to the tabulated data, the following records of southerly movements relating to birds banded in autumn 1964 and seen later in the same season are worth noting:— six in the *Dee Estuary* (November–March), one in Colwyn Bay (January), eight on Anglesey (January), one in Cardigan Bay (Mawddach Estuary in November) and one in the *Burry Inlet* (February). This last record is only the second sighting of a *Morecambe Bay*-marked bird in South Wales. None have yet been observed (or recovered) further south, e.g. in the *Exe Estuary* and other Devon haunts.

Whilst some southerly records refer to birds banded in autumn, and hence presumably on migration through *Morecambe Bay*, others appear to indicate short movements during the winter months, perhaps in response to sudden sharp frosts. For instance, eight of the Anglesey sightings occurred during an exceptionally massive influx of Oystercatchers on that island early in January 1965, coinciding with a brief cold spell (A. J. Mercer, pers. comm.).

Dispersal from the Dee Estuary Interpretation of the results from this area is complicated by anomalies between the colour-banding and recovery data. Superficially, the general pattern indicated by colour-banding (Table 17) resembles that shown by ringing returns, and supports the earlier suggestion that *Dee* Oystercatchers were marked during a period of local population instability and re-distribution among the adjacent haunts. Closer examination of the data, however, reveals important differences. These may be due to the inherent limitations of bird-ringing as a tool for studying a long-lived and widely distributed species of shore-bird over a period as short as four years.

In the *Dee Estuary*, locally marked birds were always numerous in the passage and wintering flocks, but Table 17 also shows that their general level of abundance represented less than 5 per cent of the number marked and, allowing for a 25 per cent mortality rate, still less than about 10 per cent of the likely survivors at a particular time. Thus, some 90 per cent of *Dee*-banded Oystercatchers were later dispersed outside the *Dee* area. The estimates show that considerable numbers occurred 50 miles to the north in *Morecambe Bay*, where they sometimes exceeded those present in the *Dee* itself, whilst others were scattered westwards along the North Wales coast. To the south, some *Dee*-banded birds were usually found in the *Burry Inlet* area, being most numerous in autumn and thus indicating southerly passage, while a few occurred annually in Devon. Although nearly half (45–50 per cent) of those banded in the *Dee* had been caught in autumn, about one third of the birds observed in southern haunts had been trapped in the *Dee* in a previous winter. However, despite their numbers in the observation and banding areas, the whereabouts of the great majority of Oystercatchers banded in the *Dee Estuary* are not revealed. It will be recalled that a similar situation is demonstrated for birds marked in *Morecambe Bay*.

Several possible explanations may be considered: loss of colour-bands, errors in visual sampling and population size estimations, a mortality rate considerably higher than 25 per cent per annum, and a wide dispersal to more distant wintering grounds. However, colour-band loss was very small (Table 25) and,

likewise, large sampling errors (e.g. due to persistent clumping and overlooking of marked birds) and gross underestimates of population size may be ruled out. Furthermore, the ringing evidence does not indicate a mortality of the magnitude required to produce such a low level of abundance of marked birds within only two to four years, nor does it suggest the scattering of many birds to distant haunts in the British Isles and abroad. Although the possibility that the ringing results themselves are highly biased should not be discounted, there is no obvious reason why such a bias should be particularly excessive for *Dee*-banded birds. Thus, no convincing explanation can be offered for the 'disappearance' of so many of the Oystercatchers colour-banded in the *Dee Estuary*.

Dispersal from Conway Bay Much more information is available on the movements of *Conway Bay* Oystercatchers from colour-banding than from ringing returns. The analysis (Table 18) shows that birds banded here in 1964, all in autumn (August–November), re-occurred through the 1965–66 and 1966–67 observation seasons far more plentifully in the banding area than anywhere else. Even so, and allowing for mortality, it does not appear that more than half could have been present in the bay on any occasion. However, extremely few occurred in neighbouring haunts (see also Figure 21), although previously, during the actual season of banding (1964–65), there had been six sightings in the *Dee Estuary*, nine in Colwyn Bay and twelve on Anglesey, referring to probably at least twelve different individuals in all. To the north, a *Conway Bay*-banded bird in breeding plumage had been seen in *Morecambe Bay* in March, when presumably on spring migration.

Many birds probably wintered south of *Conway Bay*, for onward movement is demonstrated by the sightings in the *Burry Inlet* area, to which may be added six records shortly after banding. However, none has yet been recovered to the south, which, considering the above visual evidence and the fact that all were ringed in autumn, suggests that the ringing recoveries are not a true reflection of movements. This could be because the recovery rate is so low and erratic.

Dispersal from the Burry Inlet The colour-banding evidence (Table 19) agrees closely with the results from ringing. There was virtually no movement of marked Oystercatchers from the *Burry Inlet* to the other four marking areas, nor any definite sign of a wider dispersal. To the Inlet itself locally-banded birds clearly returned in considerable numbers (see also Davidson 1967), and Table 43 suggests that most survivors were present again each autumn and winter. Their regular occurrence in the nearby important haunt of the Three Rivers Estuary demonstrates a certain degree of interchange between these two major wintering grounds in South Wales.

None of the *Burry Inlet* birds were recorded in the *Exe* and Taw estuaries in Devon, suggesting (as did the recovery data) that even though all the birds were banded in autumn, relatively few could have been bound for more southerly wintering grounds. To the north, *Burry Inlet* birds were seen in very small numbers almost annually in north-west Wales (mainly during migration periods), and on two occasions in *Morecambe Bay*, but none were observed in the *Dee Estuary*.

Dispersal from the Exe Estuary Although the sample data for this marking area are sparse (Table 45) numerous incidental records from local observers can be taken into account. The colour-banding observations agree well with the few ringing data, and show a pattern similar to that found for *Burry Inlet* Oystercatchers. Birds banded in the *Exe*, all in autumn, were frequently observed there in later seasons, and the few sample counts indicate that the great majority were re-occurring in the estuary. Five sightings from the nearby Teign Estuary were not unexpected, for there is known, from direct watching, to be some movement between these two haunts (R. G. Adams, pers. comm.).

Elsewhere, there were only two sightings of *Exe* birds, and both out of samples: one in *Conway Bay* in late August, and one on Anglesey, also in autumn (Appendix VII). Both were, therefore, probably on passage south.

Table 16 The observed 'winter' distribution of colour-banded Oystercatchers marked in *Morecambe Bay*

Dates of observation	Observation areas																					
	Morecambe Bay		Ribble Estuary		Dee Estuary		Colwyn Bay		Conway Bay		Anglesey		Cardigan Bay		South Pembs.		Three Rivers Estuary		Burry Inlet		Taw Estuary		Exe Estuary	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1964–65	*648*																							
August					0	*0*			0	*0*														
September	355–444	*54.8–68.5*			0	*0*			0	*0*	1	*0.2*												
October					0	*0*			2	*0.3*														
November					1	*0.2*	0	*0*	0	*0*			0	*0*										
December	36– 54	*5.6– 8.3*			1	*0.2*									0	*0*			0	*0*	0	*0*	0	*0*
January	71–107	*11.0–16.5*			0	*0*	0	*0*	0	*0*	5*	*0.8*	0	*0*	0	*0*	0	*0*	0	*0*				
February	127–191	*19.6–29.5*			1	*0.2*	0	*0*	3	*0.4*									0	*0*	0	*0*	0	*0*
March	48–106	*7.4–16.4*			0	*0*	0	*0*	1	*0.2*									0	*0*				
1965–66	*874*																							
August					0	*0*			1	*0.1*	0	*0*												
September	433–479	*49.5–54.8*			0	*0*			0	*0*	0	*0*							0	*0*				
October	125–208	*14.3–23.8*	0	*0*	2	*0.2*			1	*0.1*	2	*0.2*							0	*0*	0	*0*	0	*0*
November					0	*0*			1	*0.1*	3	*0.3*	0	*0*					0	*0*				
December	117–156	*13.4–17.8*			1	*0.1*					4	*0.5*												
January	90–135	*10.3–15.4*	0	*0*	0	*0*			0	*0*	0	*0*							0	*0*				
February					0	*0*	0	*0*	1	*0.1*							0	*0*	0	*0*				
March	17– 33	*2.0– 3.8*			<4	*<0.5*			0	*0*									0	*0*				
1966–67	*874*																							
August	147–221	*16.8–25.3*							0	*0*														
September									3	*0.3*	0	*0*							0	*0*				
October	192–384	*22.0–43.9*					0	*0*	0	*0*			0	*0*	0	*0*	0	*0*	0	*0*			0	*0*
November	13– 26	*1.5– 3.0*							0	*0*	2	*0.2*					0	*0*	8	*0.9*				
December	53–106	*6.1–12.1*			0	*0*	0	*0*	0	*0*	0	*0*					0	*0*	0	*0*				
January					0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
February							0	*0*	0	*0*	0	*0*					0	*0*						
March							0	*0*	2	*0.2*	0	*0*	0	*0*										

* Recorded during a brief but abnormally large cold-weather influx of c.10 000 Oystercatchers.

Table 17 The observed 'winter' distribution of colour-banded Oystercatchers marked in the *Dee Estuary*

Dates of observation	Observation areas																					
	Morecambe Bay		Ribble Estuary		Dee Estuary		Colwyn Bay		Conway Bay		Anglesey		Cardigan Bay		South Pembs.		Three Rivers Estuary		Burry Inlet		Taw Estuary		Exe Estuary	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1964–65					*1 934*																			
August					47	*2.4*			10	*0.5*														
September	54– 68	*2.8– 3.5*			40	*2.0*			2	*0.1*	11	*0.6*												
October									8	*0.4*														
November							0	*0*	11	*0.6*			0	*0*										
December	41– 62	*2.1– 3.2*			66	*3.4*									0	*0*			0	*0*	1	*<0.1*	5	*0.3*
January	36– 54	*1.9– 2.8*			51	*2.6*	7	*0.4*	27	*1.4*	60*	*3.1*	0	*0*	0	*0*	14	*0.7*	5	*0.3*				
February	40– 60	*2.1– 3.1*			26	*1.3*	11	*0.6*	18	*0.9*									0	*0*	0	*0*	0	*0*
March	30– 65	*1.6– 3.4*			20	*1.0*	6	*0.3*	17	*0.9*									4	*0.2*				
1965–66					*2 261*																			
August					75	*3.3*			17	*0.8*	0	*0*												
September	236–260	*10.4–11.5*			96	*4.2*			6	*0.3*	8	*0.4*							0	*0*				
October	167–278	*7.4–12.3*	10	*0.5*	124	*5.5*			20	*0.9*	0	*0*							0	*0*	1	*<0.1*	0	*0*
November					44	*1.9*			22	*1.0*	11	*0.5*	4	*0.2*					36	*1.6*				
December	143–181	*6.3– 8.0*			70	*3.6*					13	*0.6*												
January	20– 30	*0.9– 1.3*	8	*0.4*	54	*2.8*			7	*0.3*	0	*0*							15	*0.7*				
February					< 30	*<1.6*	0	*0*	14	*0.7*							7	*0.3*	7	*0.3*				
March	13– 26	*0.6– 1.2*			< 20	*<1.0*			21	*1.1*									2	*0.1*				
1966–67					*2 261*																			
August	57– 86	*2.5– 3.8*							6	*0.3*														
September									16	*0.7*	0	*0*							0	*0*				
October	68–135	*3.0– 6.0*					5	*0.2*	7	*0.3*			2	*0.1*	0	*0*	10	*0.4*	15	*0.7*			0	*0*
November	13– 26	*0.6– 1.2*							11	*0.5*	2	*0.1*					5	*0.2*	76	*3.4*				
December	38– 76	*1.7– 3.4*			} 90	*4.0*	6	*0.3*	7	*0.3*	0	*0*					0	*0*	3	*0.1*				
January							5	*0.2*	12	*0.5*	0	*0*	0	*0*	0	*0*	0	*0*	10	*0.4*	0	*0*	5	*0.2*
February							3	*0.1*	10	*0.4*	0	*0*					0	*0*						
March							3	*0.1*	6	*0.3*	0	*0*	0	*0*										

* Recorded during a brief but abnormally large cold-weather influx of c.10 000 Oystercatchers.

Notes for Tables 16–19

1. Values of N (the estimated numbers present) are taken from those calculated in Tables 37–45 (Appendix VII), and from Table 15; the percentage figures are the estimated numbers as percentages of the number marked to date.
2. Figures in italics are the total numbers of birds colour-banded in each area in preceding seasons. They are, therefore, the maximum numbers which could be alive and eligible for analysis during the given observation season. No allowance for mortality is made here, but see Appendix VII.

Table 18 The observed 'winter' distribution of colour-banded Oystercatchers marked in *Conway Bay*

Dates of observation	Observation areas																			
	Morecambe Bay		Ribble Estuary		Dee Estuary		Colwyn Bay		Conway Bay		Anglesey		Cardigan Bay		South Pembs.		Three Rivers Estuary		Burry Inlet		Taw Estuary		Exe Estuary	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1965–66									*277*															
August					0	*0*			102	*36.8*	0	*0*												
September	0	*0*			2	*0.7*			117	*42.3*	4	*1.4*							0	*0*				
October	13– 23	*4.7– 8.3*	0	*0*	3	*1.1*			94	*33.9*	0	*0*							0	*0*	0	*0*	0	*0*
November					0	*0*			90	*32.4*	3	*1.1*	0	*0*					0	*0*				
December	4– 6	*1.4– 2.2*			0	*0*					4	*1.4*												
January	0	*0*	0	*0*	0	*0*					0	*0*							5	*1.8*				
February					0	*0*	0	*0*	66	*23.8*							2	*0.7*	0	*0*				
March	0	*0*			0	*0*			28	*10.1*									0	*0*				
1966–67									*277*															
August	0	*0*							48	*17.3*														
September									70	*25.3*	0	*0*							3	*1.1*				
October	0	*0*					0	*0*	77	*27.8*			0	*0*	0	*0*	0	*0*	0	*0*			0	*0*
November	0	*0*							91	*32.9*	0	*0*					0	*0*	15	*5.4*				
December	0	*0*			0	*0*	0	*0*			0	*0*					0	*0*	3	*1.1*				
January					0	*0*	0	*0*	46	*16.6*	0	*0*	0	*0*	0	*0*	0	*0*	10	*3.6*	0	*0*	0	*0*
February							0	*0*	29	*10.5*	0	*0*					0	*0*						
March							0	*0*	26	*9.4*	0	*0*	0	*0*										

Table 19 The observed 'winter' distribution of colour-banded Oystercatchers marked in the *Burry Inlet*

Dates of observation	Observation areas																					
	Morecambe Bay		Ribble Estuary		Dee Estuary		Colwyn Bay		Conway Bay		Anglesey		Cardigan Bay		South Pembs.		Three Rivers Estuary		Burry Inlet		Taw Estuary		Exe Estuary	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1964–65																								
August					0	*0*			0	*0*									*240*					
September	0	*0*			0	*0*			0	*0*	0	*0*												
October					0	*0*			0	*0*														
November					0	*0*	0	*0*	0	*0*			8	*3.3*										
December	0	*0*			0	*0*									0	*0*			137	*57.1*	0	*0*	0	*0*
January	0	*0*			0	*0*	0	*0*	0	*0*	14	*5.8*	0	*0*	0	*0*	5	*2.1*	110	*45.8*				
February	0	*0*			0	*0*	0	*0*	0	*0*									134	*55.8*	0	*0*	0	*0*
March	0	*0*			0	*0*	0	*0*	0	*0*									72	*30.0*				
1965–66																								
August					0	*0*			0	*0*	0	*0*							*292*					
September	0	*0*			0	*0*			0	*0*	0	*0*							191	*65.4*				
October	0	*0*	0	*0*	0	*0*			0	*0*	2	*0.7*							138	*47.3*	0	*0*	0	*0*
November					0	*0*			0	*0*	0	*0*	1	*0.4*					143	*49.0*				
December	0	*0*			0	*0*					9	*3.1*												
January	0	*0*	0	*0*	0	*0*			0	*0*	0	*0*							94	*32.2*				
February					0	*0*	0	*0*	0	*0*							12	*4.1*	35	*12.0*				
March	0	*0*			0	*0*			0	*0*									4	*1.4*				
1966–67																								
August	11– 17	*3.8– 5.8*							0	*0*									*292*					
September									0	*0*	0	*0*							54	*18.5*				
October	0	*0*					0	*0*	0	*0*			0	*0*	3	*1.0*	29	*9.9*	91	*31.2*			0	*0*
November	0	*0*							0	*0*	0	*0*					0	*0*	137	*46.9*				
December	0	*0*			0	*0*	0	*0*	0	*0*	0	*0*					10	*3.4*	39	*13.4*				
January					0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	12	*4.1*	77	*26.4*	0	*0*	0	*0*
February							0	*0*	0	*0*	0	*0*					0	*0*						
March							0	*0*	0	*0*	0	*0*	0	*0*										

Notes for Tables 16–19

1. Values of N (the estimated numbers present) are taken from those calculated in Tables 37–45 (Appendix VII), and from Table 15; the percentage figures are the estimated numbers as percentages of the number marked to date.
2. Figures in italics are the total numbers of birds colour-banded in each area in preceding seasons. They are, therefore, the maximum numbers which could be alive and eligible for analysis during the given observation season. No allowance for mortality is made here, but see Appendix VII.

Table 20 The relative abundance and distribution within *Morecambe Bay*, during the observation seasons 1964–65, 1965–66 and 1966–67, of colour-banded Oystercatchers from each of the three trapping sites in the bay

Sub-area and observation season	Total birds examined	Total locally colour-banded birds seen	Marking areas and winter classes of locally banded birds seen															
			Flookburgh								*Heysham*						*Walney Island*	
			1962–63		1963–64		1964–65		Total		1963–64		1964–65		Total		1963–64	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Flookburgh																		
1964–65	3 731	40	10	*25.0*	29	*72.5*	–	–	39	*97.5*	1	*2.5*	–	–	1	*2.5*	0	*0*
1965–66	4 253	50	16	*32.0*	12	*24.0*	19	*38.0*	47	*94.0*	2	*4.0*	0	*0*	2	*4.0*	1	*2.0*
1966–67	6 047	90	21	*23.3*	18	*20.0*	49	*54.4*	88	*97.8*	0	*0*	2	*2.2*	2	*2.2*	0	*0*
Heysham																		
1964–65	7 484	23	2	*8.7*	1	*4.3*	–	–	3	*13.0*	16	*69.6*	–	–	16	*69.6*	4	*17.4*
1965–66	4 570	8	1	*12.5*	0	*0*	1	*12.5*	2	*25.0*	3	*37.5*	2	*25.0*	5	*62.5*	1	*12.5*
1966–67	2 828	9	1	*11.1*	2	*22.2*	6	*66.7*	9	*100.0*	0	*0*	0	*0*	0	*0*	0	*0*
Walney																		
1964–65	3 758	110	4	*3.6*	0	*0*	–	–	4	*3.6*	0	*0*	–	–	0	*0*	106	*96.4*
1965–66	4 020	52	5	*9.6*	1	*1.9*	2	*3.8*	8	*15.4*	0	*0*	0	*0*	0	*0*	44	*84.6*
1966–67	*no data*	–																

Note
The percentages shown are, for each column, the numbers in that column as percentages of the number on the same line in the column: Total locally colour-banded birds seen.

Table 21 The relative abundance within *Morecambe Bay*, during the 1964–65, 1965–66 and 1966–67 observation seasons, of colour-banded Oystercatchers from each of the three trapping sites in the bay: expressed relative to the proportions in which originally marked for the derivation of mixing indices (Figure 20)

Season	Sub-area	Number of birds colour-banded in each sub-area before the observation season*		Marking areas and ratios of relative abundance of locally banded birds seen					
				Flookburgh		*Heysham*		*Walney Island*	
				Ratio	Mixing index	Ratio	Mixing index	Ratio	Mixing index
1964–65	*Flookburgh*	303	*0.47*	0.98	0.323	0.02	0.034	0	0
	Heysham	58	*0.09*	0.13	0.043	0.70	1.206	0.17	0.059
	Walney	287	*0.44*	0.04	0.013	0	0	0.96	0.334
1965–66	*Flookburgh*	518	*0.59*	0.94	0.181	0.04	0.057	0.02	0.007
	Heysham	69	*0.08*	0.25	0.048	0.63	0.913	0.13	0.045
	Walney	287	*0.33*	0.15	0.029	0	0	0.85	0.296
1966–67	*Flookburgh*	518	*0.59*	0.98	0.189	0.02	0.030	0	0
	Heysham	69	*0.08*	1.00	0.193	0	0	0	0
	Walney	287	*0.33*	*no observations in 1966–67*					

Notes
For derivation of Ratios of Relative Abundance and Mixing Indices see text, p. 47.
* The figures in italics show the numbers as proportions of the total.

Movements within study areas

The tendency for Oystercatchers to re-occur more often in their respective banding areas than anywhere else can be shown to hold true even for birds marked at different sites within a single study area. Data are available for *Morecambe Bay* and *Conway Bay* which suggest that within each of these two areas the flocks feeding in different sub-areas tended not to intermingle at random but to remain relatively discrete from one another. For the *Burry Inlet* and *Exe Estuary* flocks information is lacking, whilst the behaviour of Oystercatchers in the *Dee Estuary* will be described elsewhere by Dr. E. White.

Morecambe Bay Oystercatchers were colour-banded with special sub-area codes at three widely separated trapping sites around this very large bay: (a) Walney Island (south end)—situated at the entrance to the bay on its north-west side; (b) Flookburgh sands—between Cowpren Point and Humphrey Head in the upper part of the bay, and about 10 miles north-east of Walney Island; and (c) Heysham—situated about half-way down the eastern shore of the bay, seven miles S.S.E. of the Flookburgh sands trapping site and 11 miles east of Walney Island. The distribution within the bay of their three main preys—mussels, cockles and *Macoma balthica*—determined the food habits of the Oystercatchers in each sub-area. Mussels are the staple food in the Walney and Heysham sub-areas, whereas in the Flookburgh district, during the study period itself, the flocks fed mainly on *Macoma* and, whenever they were available, also on cockles. Some terrestrial feeding occurred all around the bay but was most prevalent about Flookburgh.

Trapping periods and numbers colour-banded at each site differed markedly (Table 23, in Appendix I). The 287 birds banded at Walney Island were all from one autumn catch (September 1963). At Heysham, only 69 were banded, and nearly all in spring (March–April 1964). At Flookburgh, on the other hand, the 518 birds marked were taken between October and March, over a three years' period. Observational data were collected during the 1964–65, 1965–66 and 1966–67 observation seasons, from samples totalling nearly 37 000 birds; of these, ca. 380 were found to be wearing bands with *Morecambe Bay* colour codes. The observations were made in the general vicinity (i.e. usually within two miles) of the trapping sites, and often on the respective feeding grounds. The data (Tables 20–21, and Figure 20) are analysed by the first method (A) and, as before, records during the 1964–65 season relating to birds banded in autumn 1964 are excluded from the analysis of samples.

A similar pattern of behaviour is indicated for the first two observation seasons. In the third season, however, this pattern is less evident, due to lack of observations from the Walney sub-area and also, perhaps, to the original number (69) of birds banded in the Heysham sub-area being so small. Nevertheless, when taken overall, the data are reasonably consistent in indicating only limited interchange between the three sub-areas. Thus, Oystercatchers banded at Walney Island seldom appeared in the upper reaches of the bay, and then they were more liable to be found on the Heysham mussel beds than on the Flookburgh sands. Birds from Flookburgh were only occasionally recorded in the Walney area, but there was a more regular exchange with the nearer Heysham haunt. Observations made out of samples, together with ringing recoveries, tend to confirm this. Out of samples, there were 13 sightings of Flookburgh birds at Heysham (most relating to birds banded in autumn 1964 and seen later that season) and three sightings of Heysham birds at Flookburgh (though all between April and June), but only one sighting of a Walney bird at Flookburgh (in July) and of two at Heysham.

The ringing data, though very imperfect, show that whereas some birds had moved to alternative feeding grounds in the bay, many Oystercatchers re-occurred at their respective places of ringing. To avoid errors due to tidal drifting, all recoveries 'found dead' on the shore are discarded, but any found in fields are included. The majority of accepted records refer to live retraps, or to birds shot by Fishery Officers and picked up on the spot. The records are therefore concentrated in the Heysham and Flookburgh sectors of the bay, where all the shooting and most of the trapping was done. Of Oystercatchers ringed at Flookburgh, 29 were subsequently killed or retrapped there, and 13 were shot at Heysham. Of birds ringed at Heysham, four were shot and one retrapped there, and one was recaptured at Flookburgh. Again, however, few birds from Walney Island were recorded in the upper bay, two being shot and one retrapped at Heysham, and one retrapped at Flookburgh.

The combined evidence indicates that the Oystercatcher flocks frequenting different parts of *Morecambe Bay* tended to remain separate from one another. The persistent scarcity of Walney-banded birds on the Flookburgh sands, and the limited interchange at times between these sands and the Heysham scars, when considered in relation to the local distribution of the three main prey species, together suggest that food preferences played a part in segregating the flocks. That distance was also a likely factor is apparent from the comparatively restricted movement of birds from the mussel beds off Walney Island to those at Heysham, some nine miles away at low tide. The change of diet demonstrated by some Flookburgh-banded birds, which switched from eating *Macoma* and cockles on the sands to taking mussels on the scars at Heysham, may have been enforced partly by the great dearth of cockles everywhere in the bay following the severe 1962–63 winter, and partly by temporary shortages of the smaller alternative prey (i.e. *Macoma balthica*). Movements to Heysham are doubtless facilitated by the narrowness (1½ miles width at low-water spring tides) of the channel which separates the lowest feeding grounds of Flookburgh Oystercatchers from the abundant mussel stocks on the outer Heysham scars. At times of low water Oystercatchers have, in fact, been observed crossing this channel direct from the sands to the scars (D. G. Harrison, pers. comm.). It seems all the more striking, therefore, that the proportion of Flookburgh-banded Oystercatchers recorded again in their marking area was so high.

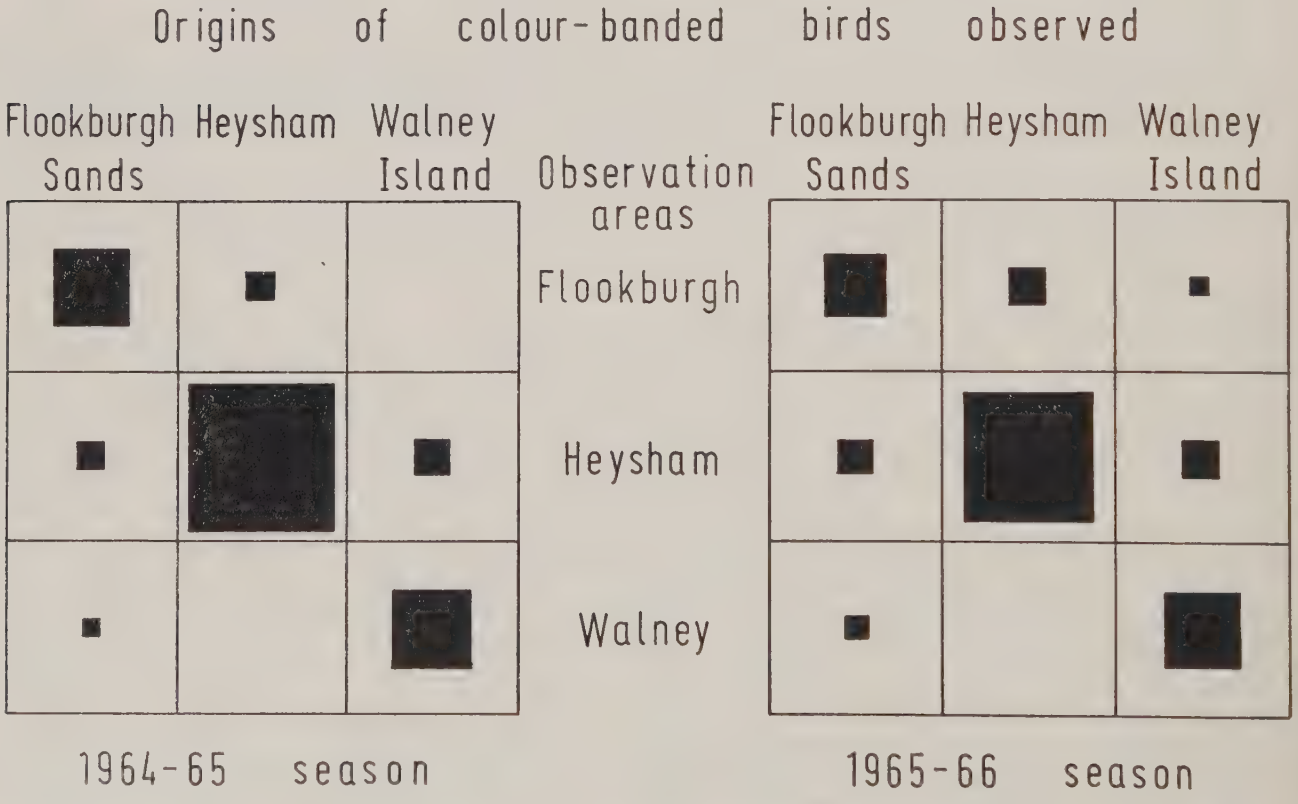

Figure 20 Diagram to indicate the extent of movements between three sub-areas in *Morecambe Bay* by locally colour-banded Oystercatchers during the 1964–65 and 1965–66 observation seasons. The filled squares represent the indices of mixing for birds banded in each of the three sub-areas (see Tables 20 and 21). When compared either horizontally or vertically, but not diagonally, the relative sizes of the squares and their distribution on the grid indicate the extent of non-random mixing between the sub-areas. Random intermingling would be indicated when all subdivisions of the grid contained squares of approximately equal size.

Conway Bay During the 1964 autumn (August to November) 277 Oystercatchers were colour-banded in this bay near Llanfairfechan, on the shore of the Lavan Sands wintering ground. Subsequently, sample counts of flocks were made regularly in all the main haunts in North Wales, from the *Dee Estuary* to Anglesey, except at Colwyn Bay in the 1965–66 observation season. The results are summarized in Table 22 and Figure 21, the frequency of occurrence of *Conway Bay*-banded Oystercatchers at each place being expressed as a percentage of the number of birds examined. The data refer to that part (December–March) of the 1964–65 observation season immediately following the completion of banding in this area, and to the entire 1965–66 and 1966–67 seasons. Observations made during the banding period itself are therefore excluded. Records during the 1964–65 season thus illustrate the local dispersal pattern shortly after banding, for comparison with the 1965–66 and 1966–67 seasons' records which largely indicate re-occurrences after an absence for breeding.

Table 22 The distribution, or dispersal, in North Wales of the Oystercatchers colour-banded in *Conway Bay* at Llanfairfechan during autumn 1964 (Figure 21)

Wintering area and season	Birds examined	Total colour-banded birds seen *all area codes*	Birds with *Conway Bay* codes	Frequency of *Conway Bay* birds in flocks
	A	B	C	C/A %
1964–65				
Dee Estuary	15 626	413	4	0.03
Colwyn Bay	2 266	73	8	0.4
Conway	3 043	37	13	0.4
Llanfairfechan	1 867	163	150	8.0
Aber	1 319	55	36	2.7
Red Wharf Bay	606	13	2	0.3
South-west Anglesey	1 841	23	3	0.2
1965–66				
Dee Estuary	31 580	584	7	0.02
Colwyn Bay	*no data*			
Conway	8 444	58	22	0.3
Llanfairfechan	4 689	356	344	7.3
Aber	11 404	329	259	2.3
Red Wharf Bay	1 592	16	3	0.2
South-west Anglesey	859	2	0	0
1966–67				
Dee Estuary	4 563	66	1	0.02
Colwyn Bay	1 892	23	0	0
Conway	9 194	49	15	0.2
Llanfairfechan	4 866	187	168	3.5
Aber	6 643	130	108	1.6
Red Wharf Bay	1 570	1	0	0
South-west Anglesey	3 731	3	0	0

Notes
1. The 1964–65 observation season has been confined to the period (December–March inclusive) immediately following the termination, in November 1964, of all local colour-banding; the 1965–66 and 1966–67 seasons extended from August to March, inclusive.
2. South-west Anglesey covers the coast from Llanddwyn Bay to Beddmanarch Bay; a few observations from very minor haunts elsewhere are included.

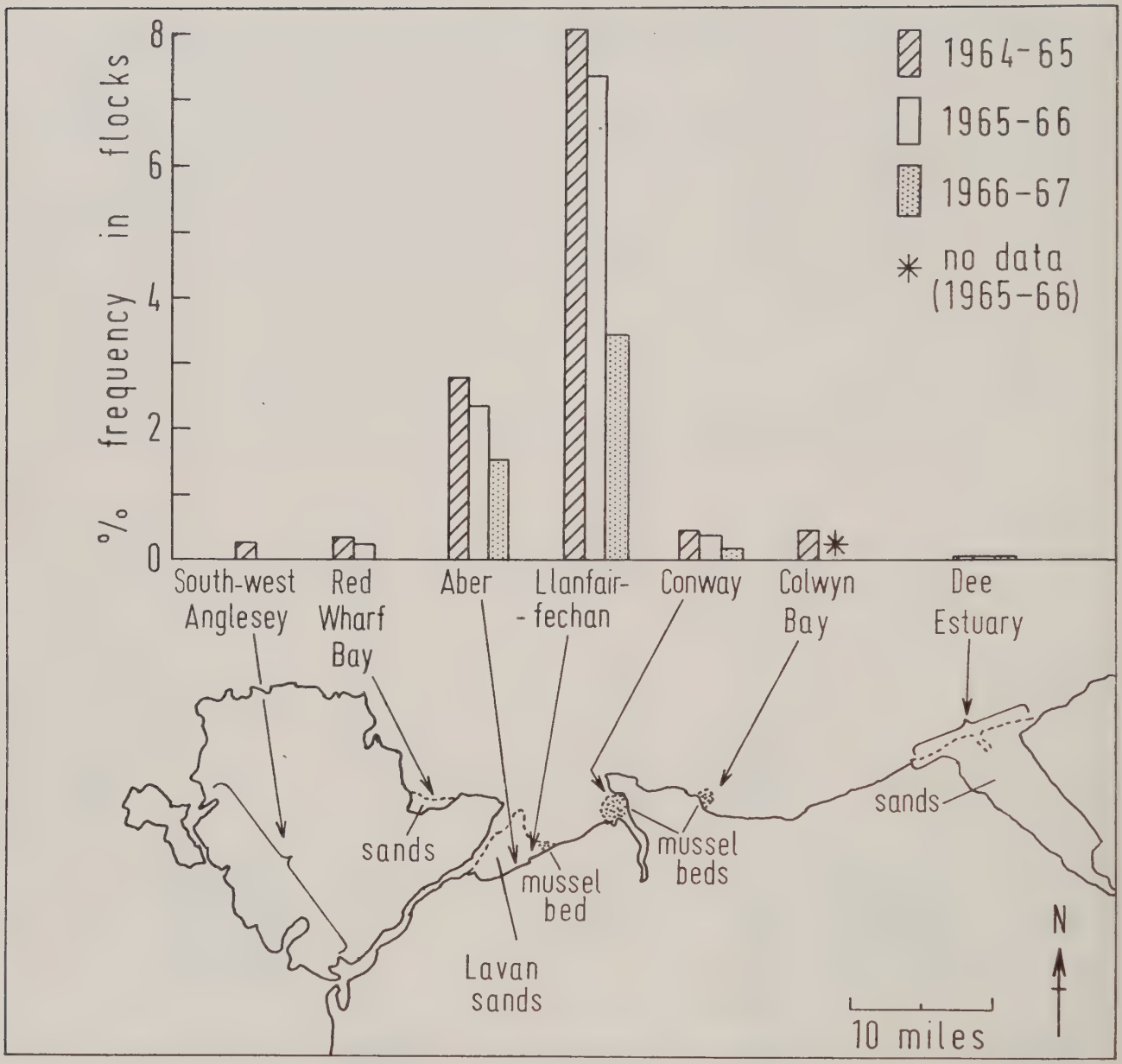

Figure 21 Diagram showing the non-random distribution in North Wales, during the 1964–65, 1965–66 and 1966–67 observation seasons, of the Oystercatchers colour-banded in *Conway Bay* at Llanfairfechan in autumn 1964. A strong tendency to remain loyal to the place where captured is demonstrated.

If random mixing between flocks had occurred the frequency of *Conway Bay*-banded birds would be expected to have been similar everywhere. Figure 21 shows that, on the contrary, there were large differences in local representation. Many birds remained loyal to the original capture area, and initial dispersal in either direction along the coast took place only on a small scale. Few birds moved the five miles eastwards to the other important feeding area in the bay, at the mouth of the Conway Estuary, and they were seen quite rarely in the *Dee Estuary*. Even at Aber, only 1½ miles westward from the marking site, there was a marked decline in their frequency of occurrence. Throughout the 1965 and 1966 breeding seasons a small number of mainly immature banded birds remained. Many then returned in the 1965 and 1966 autumns, and a restricted distribution pattern virtually identical with that of the first season was re-established.

Within *Conway Bay* itself the banded Oystercatchers had two major feeding grounds available to them—(i) the extensive Lavan Sands and Bangor mussel beds which supported a wintering population of ca. 2 000 birds in the western part of the bay, and (ii) the large mussel beds off the mouth of the Conway Estuary at the eastern end of the bay, supporting ca. 1 500 birds through the winter. The observations show, however, that the banded Oystercatchers confined themselves largely to the eastern area of the Lavan Sands, where they fed mainly on cockles, and to a small mussel bed close by at Llanfairfechan. The comparative scarcity of banded birds on the Conway mussel beds, and their abundance on the Lavan Sands, might suggest that food preferences were at least partly responsible for the observed segregation. However, the consistent differences in frequency of the colour-bands even between two adjacent sites on the Lavan Sands themselves, as well as between the mussel beds at Llanfairfechan and Conway, point rather to site attachment behaviour independent of food.

Conclusions

The imperfections intrinsic in both the ringing and colour-banding projects, and the unavoidable complications arising from the 1962–63 severe winter, make it clear that the recovery and observational data for the passage and winter periods need to be interpreted cautiously. The need for caution is further emphasized by the anomalies revealed between recovery data and colour-banding data, which suggest that the ringing evidence is probably biased and not a true reflection of the complete pattern of Oystercatcher movements. This may be due to a combination of factors: the relatively small numbers of birds ringed, coupled with a low recovery rate; the short duration of the study, relative to the normal longevity of the Oystercatcher; and the clumped distribution of human population compared with the more widely dispersed distribution of wintering and migrant Oystercatchers. Nevertheless, attention can reasonably be drawn to several significant features of wintering behaviour which now seem to be emerging, for whilst these may be clarified by further recoveries they could become obscured completely by changes in the present ecological régime.

Despite these confusing elements, there yet remains an inescapable conclusion that the Oystercatchers in each study area did not mingle at all freely in winter with those in the other study areas. Furthermore, recorded movements to haunts elsewhere in the country were restricted mainly to times of passage and to major migration routes linking the study areas with the breeding grounds. Many birds were found again in their respective areas of marking after intervals of one to four years. Since most of these were already adult when marked, their recovery, recapture or sighting in the marking area, after one or more breeding seasons, further implies that some individuals returned to, or at least revisited, the same haunts after absenting themselves for breeding. In addition, there are a number of records which, taken together, indicate that some Oystercatchers may spend much of the autumn–spring period in a given non-breeding area.

DISCUSSION

THERE is now sufficient information to begin describing Oystercatcher movements at the population level, and it is to be hoped that the emphasis in future ringing activities will be directed increasingly towards selected populations. Evidence of population differences in migratory habits is strong. Thus, the breeding Oystercatchers of north-west Europe are more or less segregated in winter in two distinct wintering zones. The 'Atlantic populations'—those from the major island groups of the British Isles, Faeroes and Iceland—resort predominantly to the western coasts of the British Isles. The 'Continental populations'—those from the Baltic region and the Low Countries chiefly—winter almost exclusively on the European mainland, between the Heligoland Bight and the Atlantic seaboard of Iberia. Except for the Norwegian population, which is the only one to winter commonly in both zones, this dichotomy in migratory and wintering habits is very striking.

Contrasts in migratory behaviour exist also at lower population levels, for example among Oystercatchers breeding in different parts of the British Isles. The differences are displayed most clearly by the birds-of-the-year, when dispersing from their natal areas, but they are becoming increasingly apparent, too, in the wintering habits of the adults. For instance, Scottish Oystercatchers winter in great numbers down our western coasts but, apparently, in only very small numbers in eastern England, whereas East Anglian birds seldom visit western Britain. There is, nevertheless, much overlap in the wintering distributions of different breeding stocks—at least in western areas—and no locality can be considered as an exclusive wintering ground for one particular breeding population. Despite the resultant intermingling in winter, the fidelity of adults to their nesting territories would appear to greatly restrict exchanges between breeding populations. However, whilst first-breeding certainly tends to be in the general vicinity of the birth-place, there is evidence from ringing that this is not invariable. Whatever interchanges occur among Oystercatcher populations might, therefore, be effected primarily by young birds.

Fidelity to a particular place away from the breeding site has long been known in some wildfowl, notably in certain geese (*Anser* spp. and *Branta* spp.) which resort to traditional and often remarkably local wintering grounds, but, although suspected of waders for some time, confirmation of its existence has been obtained only very recently. It is now known, for example, that Dunlin (*Calidris alpina* (Linnaeus)) ringed in the Wash show a marked tendency not only to return to the Wash in later years but also to remain loyal to discrete areas and roosts within the Wash (Ogilvie 1965). Similarly, Turnstones (*Arenaria interpres* (Linnaeus)) have been recorded returning to a certain short length of the Northumberland coast for up to eight years after ringing (P. R. Evans, pers. comm.). More impressive still is the increasing evidence of the return of some long-distance Palaearctic wader migrants to the identical winter quarters in southern Africa. Records of Green Sandpiper (*Tringa ochrophus* Linnaeus) and Wood Sandpiper (*T. glareola* Linnaeus) returning to the same haunt in Zambia are given by Tree (1965). 'Homing' to a special wintering place is, therefore, sometimes accomplished over great distances, just as many species have demonstrated themselves capable of returning from winter quarters in the southern hemisphere to the identical nesting sites in northern latitudes.

For the Oystercatcher, the combined evidence from the M.A.F.F. ringing and colour-banding project shows that many birds tended to return annually to, and remain within, discrete and often very circumscribed wintering areas. Random intermingling clearly did not occur, not even to any detectable extent during the lengthy migration periods. It might be argued that a relatively small number of loyal individuals, which would be available for observation at the same places over several weeks or months, could present an exaggerated picture of widespread loyalty. This might well have been true, had only one wintering haunt been studied in isolation. In the present study, however, where the behaviour of Oystercatchers in several wintering areas is compared, the results clearly show that this argument is not tenable. On the contrary, there is increasing reason to believe that fidelity to a particular locality (site attachment) may eventually prove to be a general feature of Oystercatcher wintering behaviour—at least, under more or less stable conditions of prey distribution and abundance.

The various aspects of site attachment, and especially the actual length of time spent by an individual Oystercatcher in a given place, can best be investigated by means of individually unique colour codes

and an extensive supporting observation programme. Such a project, which until now has not been feasible, will shortly be undertaken in *Conway Bay*. At present, all the information available on the behaviour of individual wintering birds is represented by a few records of birds with distinctively aberrant plumage. One adult, ringed (SS 10961) and colour-banded in *Conway Bay* at Llanfairfechan on 11 September 1964, was recognizable by having two conspicuous white facial patches on the left side of the head. This bird was seen on four occasions during the 1964–65 season. On 11 October 1964 it was nine miles away, in Red Wharf Bay, but by 10 January 1965 it had returned to Llanfairfechan where it was observed again on 14 February 1965 and 1 April 1965. On each of the last three occasions it was feeding at the same small mussel bed.

The reports of county ornithological societies contain several valuable records of albinistic Oystercatchers returning to the same wintering haunts annually. In Devon, one albino spent each winter in the *Exe Estuary* for sixteen successive years (1940–56), and a partial albino frequented the shore near Bigbury each autumn and winter from January 1954 to August 1959. In Hampshire, another albino wintered regularly in Langstone Harbour for some twelve years (1947–59). Since observations have shown that the winter behaviour of albinistic Oystercatchers is in no way abnormal, the fidelity of many other Oystercatchers to given haunts may consequently be expected to persist also over very long periods—perhaps, for some birds, throughout their entire adult lifespan.

Many vital questions are likely to remain unanswered for a long time. One that requires urgent attention is the relationship between the movements of the young bird and those of the adult. If, as is suspected from the ringing of first-year birds, the young Oystercatcher becomes relatively sedentary after its initial dispersal from the birth-place, the behaviour and experiences of the immature bird might then largely influence its wintering habits later when it is adult. Dispersal itself appears to be very subject to individual variation, however, and virtually nothing is known of the manner in which it is performed. A concerted ringing study of the summering flocks of immature Oystercatchers could help to throw much-needed light on this subject.

SUMMARY

1 The movements of Oystercatchers were studied as part of a wider programme of fisheries research into problems of reducing predation damage to commercial stocks of edible cockles and mussels by large concentrations of migratory Oystercatchers.

2 The breeding areas, migration routes and local winter movements of migrant and wintering flocks frequenting major shellfish-producing areas in Wales and north-west England were investigated by ringing and colour-banding nearly 5 400 Oystercatchers in five study areas.

3 The results, when analysed in conjunction with pullus and other recoveries already available from national ringing schemes, indicate a complex migration pattern in the area of the British Isles.

4 The British coasts, and especially those around the Irish Sea, constitute the main wintering zone of the large Faeroese, Icelandic and British breeding populations, whereas comparatively few Continental Oystercatchers visit the British Isles and these come predominantly from Norway. With the exception of Norwegian Oystercatchers, Continental populations winter almost exclusively on the European mainland, between the Heligoland Bight and the Atlantic seaboard of Iberia.

5 The autumnal influx of northern birds into the British Isles, which begins in late July, coincides with a massive south to south-westerly post-breeding shift, largely within these islands, of Scottish and many other native populations. Few adult British Oystercatchers would appear to emigrate but there is a marked departure of some first-year birds to western France and Iberia, where they mingle with both adults and immatures of Continental origin.

6 Adult British Oystercatchers begin their return to breeding grounds usually in early February, and foreign birds somewhat later. Oystercatchers generally breed in the vicinity of the birth-place and often return to the same territory, and hence to a particular mate, for a number of years. Immatures remain for several years in the wintering areas and do not breed until three or four years old.

7 Results, from both ringing and colour-banding, showed that in the areas studied many Oystercatchers tended to 'home' annually to, and remain within, discrete and often very circumscribed wintering areas. There were only limited exchanges between flocks in the main west-coast wintering haunts in Wales and north-west England, and virtually no interchange with other important wintering grounds in Scotland, Ireland and south-eastern England.

8 The existence in other waders of site attachment behaviour during the winter is discussed, and the view expressed that, under more or less stable conditions of prey distribution and abundance, fidelity to a particular wintering place may be normal in the Oystercatcher. The behaviour and experiences of the Oystercatcher when immature might largely influence its wintering habits later as an adult.

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ADDENDUM

In the interval between this paper being written and going to press a year's further recovery and colour-banding data have accumulated from the 1961–64 marking programme and from the national ringing scheme. Since this additional material lends further support to the interpretations and hypotheses put forward in the text it is summarized here under the relevant section headings. The records cover the events of the 1967 breeding season and the 1967–68 winter (to 31 March 1968).

SECTION II
THE IMMATURE POPULATION

A further 42 recoveries and recaptures of British pulli, ringed mostly in northern Scotland, Wales and Norfolk, were notified between 1 June 1966 and 31 December 1967. Of these, 12 were abroad in the usual areas in western France (8), Spain (2) and Portugal (2), 10 being in their first autumn and 2 in their second year. Apart from 2 Scottish birds retrapped in East Anglia (the Wash—in their second and third years), the records conform to the patterns described earlier. The recovery of one bird killed in its sixteenth year now constitutes the record for longevity among British Oystercatchers.

SECTION III
ORIGINS OF THE BRITISH WINTERING POPULATION

Five foreign-ringed Oystercatchers were reported in the British Isles during 1967, all in Norfolk. These were from: Norway (3), Holland (1—ringed as adult on autumn passage) and Russia (1). The Russian bird is the first from that country to be recorded in Britain; it was ringed as a chick in 1967 on the White Sea coast near Kandalaksha and was found dead at Salthouse, Norfolk, in mid-September 1967. The ringing, by the Wash Wader Ringing Group, of nearly 2 400 Oystercatchers in Norfolk during the 1967–68 autumn and winter should greatly augment our knowledge of the breeding range of the Wash and other east coast flocks.

During 1967 a further 22 M.A.F.F. winter-ringed birds were recovered on breeding grounds, all in the usual areas: Norway (5), Iceland (2), Faeroe Islands (3), north and north-east Scotland (11) and north-west England (1). These had been ringed in the *Dee Estuary* (9), *Morecambe Bay* (5), *Conway Bay* (4) and *Burry Inlet* (4). One of the *Morecambe Bay*-ringed adults was found dead on the coast of north Norway (at 70°40′N), more than 1 300 miles to the north-east and by far the most distant recovery on breeding grounds to date. A colour-banded bird from *Burry Inlet* was seen in south-west Norway in April 1967.

SECTION IV
MOVEMENTS IN BRITISH WINTER QUARTERS

During the 1967–68 winter period (August–March) a further 32 recoveries accrued from birds ringed by us in 1961–64 at the following wintering areas: *Dee Estuary* (18), *Morecambe Bay* (9), *Conway Bay* (2), *Exe Estuary* (2) and *Burry Inlet* (1). Of these, 16 were found in their respective areas of ringing, and 16 in other wintering or passage haunts. Thirteen of the 18 *Dee*-ringed birds were reported from other areas, but mostly during main migration periods—*Morecambe Bay* (8), Anglesey (1), Cardigan Bay (1), Dundalk Bay (Co. Louth—1), Eden Estuary (Scotland—1), and western France (Loire Atlantique—1). A *Conway Bay* bird occurred in *Morecambe Bay* and a *Burry Inlet* bird in the Firth of Tay, whilst an *Exe Estuary* bird was found in the Outer Hebrides (North Uist)—all during spring or autumn passage.

Systematic recording of colour-banded birds in the flocks in *Conway Bay* and *Burry Inlet* continued through the 1967–68 winter, and further visits were made to the *Exe Estuary*. For the fourth successive winter Oystercatchers displayed a pronounced tendency to return to their respective marking areas, as the following summary shows (cf. Table 13):

Study area and observation season	Total birds examined	Total colour-banded birds seen	Marking areas and winter distribution of birds seen				
			Morecambe Bay (1962–65)	*Dee Estuary* (1962–65)	*Conway Bay* (1964–65)	*Burry Inlet* (1963–65)	*Exe Estuary* (1962–64)
Conway Bay 1967–68	32 854	502	4	93	404	0	1
Burry Inlet 1967–68	10 256	53	1	6	0	46	0
Exe Estuary 1967–68	2 508	33	0	1	0	0	32

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APPENDIX I

TABLES 23–26

THE NUMBERS OF OYSTERCATCHERS RINGED AND COLOUR-BANDED IN THE BRITISH ISLES, 1962–65, BY M.A.F.F. AND ASSOCIATES

The numbers of Oystercatchers marked in each of the M.A.F.F. study areas are listed in Table 23, together with relevant trapping data. The following abbreviations are used throughout Tables 23 and 24:

Trapping methods

CN = cannon-netting
FN = flight-netting
CL = clap-netting
D = dazzling

Colour-bands

W = white
Y = yellow
G = green
Bl = blue
Bk = black
R = red
O = orange
st = band fastened by staples
m = British Trust for Ornithology metal numbered ring
s = short
t = tall

Trapping areas (*Table 23*)

Dee Estuary

G = Gronant, Flintshire
T = Talacre, Flintshire
MH = Middle Hilbre Island, Cheshire
LE = Little Eye Island, Cheshire
BR = Bird Rock, Cheshire

Morecambe Bay

WI	= Walney Island	738 ringed, 287 colour-banded
F	= Flookburgh Sands	674 ringed, 518 colour-banded
H	= Heysham Sands	71 ringed, 69 colour-banded
PI	= Piel Island	10 ringed, 0 colour-banded
CI	= Chapel Island	4 ringed, 0 colour-banded

Table 23 The numbers of Oystercatchers ringed and colour-banded in the five marking areas: *Dee Estuary, Cheshire/Flintshire: Morecambe Bay, Lancashire: Conway Bay (Llanfairfechan), Caernarvonshire: Burry Inlet, South Wales: Exe Estuary, Devon*

Trapping details				Number of birds		Colour-band codes		
Marking area	Date		Method	Ringed	Colour-banded	Left leg	Right leg	Totals
Dee Estuary								
LE	1962	28/30 Nov	CN	36	36	*m*	W *s*	36
LE		28 Dec	CN	123	123	*m*	W *t*	155
LE	1963	9/10 Jan	CN	32	32	*m*	W *t*	
MH		11 Jan	CN	167	167	Y/*m*	W	297
MH		10 Feb	CN	130	130	Y/*m*	W	
G		27/28 Jan	CN	298	298	Bk/*m*	W	298
BR		7/13 Feb	CN	142	142	R/*m*	W	142
MH		24 Feb	CN	14	14	G/*m*	W	14
T		9 Mar	CN	102	102	Bl/*m*	W	102
T		26 Jun	CN	138	138	*m*	Bl/W	138
BR/MH		17 Sep/17 Oct	CN	189	189	*m*	W/O	108
						m	O/W	81
G		1/15 Nov	CN	628	628	*m*	Bk/W	175
						m	W/Bk	416
						m	G/W	25
						m	W/G	12
LE	1964	17/29 Jan	CN	73	73	*m*	R/W	29
						m	W/R	44
G		22 Oct	CN	571	261	R/*m*	Y/W	166
						G/*m*	Y/W	9
						m	Y/W	37
						m	W/Y	49
LE		6 Nov	CN	66	66	W/*m*	Y/R	66
						W/*m*	R/Y	
						W/*m*	R/G	
						W/*m*	G/R	
Total, Dee Estuary				2 709	2 399			
Morecambe Bay								
CI	1962	18/20 Sep	CN	4	–			
F		26 Sep/3 Oct	FN	17	–			
F		23 Nov/2 Dec	FN	100	100	Bl	*m*	136
F	1963	29 Jan/15 Feb	FN	39	36	Bl	*m*	
PI		27 Mar	CN	10	–			
F		30/31 Mar	FN	6	–			
WI		18 Sep	CN	738	287	Bl	O/*m*	287
F		7/21 Oct	FN	144	57	Bl *st*	R/*m st*	86
F		13/17 Dec	FN	37	29	Bl *st*	R/*m st*	
F	1964	18/29 Jan	FN	46	45	Bl *st*	Bk/*m st*	81
F		12/18 Feb	FN	25	25	Bl *st*	Bk/*m st*	
F		13/17 Mar	FN	11	11	Bl *st*	Bk/*m st*	
H		20/21 Mar	FN	33	33	*m*	R/Bk *st*	33
H		7/10 Apr	FN	27	25	R/Bk *st*	*m*	25
F		4/9 Oct	FN	137	103	Bl/R *st*	*m*	103
F		1/7 Nov	FN	69	69	R/Bl *st*	*m*	69
F		2/4 Dec	FN	43	43	Bk/Bl *st*	*m*	43
H		10 Dec	FN	11	11	*m*	Bl/Bk *st*	11
Total, Morecambe Bay				1 497	874			

Table 23—continued

Trapping details				Number of birds		Colour-band codes		
Marking area	Date		Method	Ringed	Colour-banded	Left leg	Right leg	Totals
Conway Bay	1963	13 Mar	CN	42	–			
	1964	13 Aug	CL	18	18	G *st*	*m*	124
		14 Aug	CL	2	3*	G *st*	*m*	
		25 Aug	CL	81	82*	G *st*	*m*	
		3 Sep	CL	21	21	G *st*	*m*	
		11 Sep	CL	23	23	G *st*	O/*m st*	24
		15 Sep	FN	1	1	G *st*	O/*m st*	
		21 Oct	CL	32	32	G *st*	R/*m st*	32
		21 Nov	CN	95	97*	G/R *st*	*m*	97
	1965	25 Aug	CN	1	–			
Total, Conway Bay				316	277			
* includes retraps of birds from other areas								
*Burry Inlet**	1962	11 Nov	CN	386	–			
	1963	20 Aug	CN	2	2	Y	*m*	207
		5 Sep	CN	324	205	Y	*m*	
		2 Nov	CN	31	31	Y *st*	*m*	33
		30 Nov	D	2	2	Y *st*	*m*	
	1964	25 Aug	CN	52	52	Y *st*	O/*m st*	52
Total, Burry Inlet				797	292			
* all birds caught at Whiteford Point								
*Exe Estuary**	1962	15/19 Oct	FN	12	42†	G/Bk	*m*	42
	1963	3/9 Nov	FN	52	52	G/Bk	O/*m*	52
Total, Exe Estuary				64	94			

* all birds caught at Dawlish Warren
† includes 30 birds ringed by a local ringer, D. B. Cabot

Notes (*Dee Estuary only*)
1. This table excludes 152 Oystercatchers rocket-netted by The Wildfowl Trust at Gronant on 27 September 1961 and colour-banded by E. White with a small white celluloid band on the left leg and B.T.O. metal ring on the right leg.
2. All 1964 colour-bands were of hard P.V.C. ('Darvic'); 1962–63 bands were of soft P.V.C. fastened by adhesive.

Table 24 The numbers of breeding Oystercatchers and chicks ringed and colour-banded, in the various areas, by M.A.F.F. and associates

Area		Year	Colour-band codes			
			Left leg	Right leg	Totals	
Adult breeding Oystercatchers						
South Wales	Skokholm Island	1963	triple	Y/*m*	93	
	Skokholm Island	1964	triple	Y/*m*	21	
	Skokholm Island	1965	triple	Y/*m*	18	*132*
	Skomer Island	1963	*m*	Y	1	
	Skomer Island	1964	O/*m st*	Y *st*	19	
	Skomer Island	1965	O/*m st*	Y *st*	1	*21*
North Wales	Bardsey Island	1964	*m*	G *st*	5	*5*
	Anglesey	1963	*m*	G	1	
	Anglesey	1963	triple	G/*m st*	1	
	Anglesey	1964	triple	G/*m st*	25	
	Anglesey	1965	triple	G/*m st*	49	
	Anglesey	1965	triple	Bk/G/*m st*	4	*80*
Lancashire	Lune Valley	1963	*m*	Bl	1	
	Kent Estuary	1964	*m*	Bl *st*	3	*4*
Shetland	Fair Isle	1964	*m*	O/G	7	
	Fair Isle	1965	Bk/*m*	O/G	3	*10*
Aberdeenshire	Ythan Valley	1965	*m*	Bk *st*	1	
	Ythan Valley	1965	*m*	Bl/G *st*	5	
	Sands of Forvie	1965	*m*	Bl/G *st*	18	*24*
Total adults						*276*
Oystercatcher chicks (pulli)						
South Wales	Skomer Island	1963	*m*	Y	28	
	Skomer Island	1964	*m*	O/Y	4	
	Skokholm Island	1963	*m*	Y+Bk stripe	c. 38	
	Skokholm Island	1964	*m*	Y+R stripe	52	
	Skokholm Island	1965	*m*	Y+O stripe	18	
	Burry and Towy Estuaries	1964	*m*	Y	5	*c. 145*
North Wales	Anglesey	1962–64	*m*	G	118	
	Bardsey Island	1963	*m*	G	17	
	Aberystwyth	1964	*m*	G	1	*136*
Northern	Morecambe Bay	1962–63	*m*	Bl	15	
England	Lune Valley	1963	*m*	Bl	5	
	Eden Valley	1963	*m*	Bk	1	
	Coquet Valley	1963	*m*	Bk	5	
	Breamish Valley	1963	*m*	Bk	2	*28*
South-West	Inland	1963	*m*	Bk	25	
Scotland	Inland	1965	*m*	Bl/G *st*	11	*36*
North-East	Highlands and coast	1963	*m*	Bl/G	5	
Scotland	Highlands and coast	1965	*m*	Bl/G *st*	35	
	Highlands and coast	1965	*m*	Bk *st*	6	*46*
Shetland	Fair Isle	1963	*m*	Bl/G	27	
	Fair Isle	1964	*m*	O/G	27	
	Fair Isle	1965	Bk/*m*	O/G	5	*59*
Norfolk	Blakeney Point	1963–64	*m*	Y/Bk	20	
	Scolt Head	1963	*m*	Y/Bk	c. 30	
	Scolt Head	1964	*m*	Y/Bk	40	
	Scolt Head	1964	Y/*m*	Y/Bk	10	
	Scolt Head	1965	R/*m*	Y/Bk	48	*c. 148*
Total pulli						*c. 598*

Notes
1. triple=composite band of two or three colours used for recognition of individual birds.
2. Vertical stripes were used to denote year-classes of Skokholm pulli.

Table 25 The losses of colour-bands from M.A.F.F. Oystercatchers, determined from recaptures and finders of dead birds

Method of fastening	Time interval to recovery *months*	Number of birds reported	State of bands at recovery		
			Intact	Partial loss	Complete loss
Adhesive *Evostik*	0– 6	14	13		1
	7–12	9	9		
	13–18	5	5		
	19–24	5	4		1
	25–30	6	5	1	
	31–36	4	3	1	
	37–42	0			
	43–48	2	2		
Totals		45	41 *91.1%*	2 *4.5%*	2 *4.5%*
Adhesive *Tensol*	0– 6	30	25	3	2
	7–12	27	23	4	
	13–18	11	10	1	
	19–24	12	7	4	1
	25–30	6	3	2	1
	31–36	3	3		
	37–42	3	3		
	43–48	2	2		
	49–54	1	1		
Totals		95	77 *81.1%*	14 *14.7%*	4 *4.2%*
Staples stainless steel	0– 6	21	20	1	
	7–12	10	10		
	13–18	8	8		
	19–24	22	21		1
	25–30	15	11	2	2
Totals		76	70 *92.1%*	3 *3.9%*	3 *3.9%*

Notes

1. 'Partial' losses refer to multiple colour codes; 'complete' losses to either single or multiple codes.
2. Losses of stapled bands,which are elliptical in cross-section, were due to notching and splitting at the point of maximum curvature after the P.V.C. had hardened with long exposure. The staples themselves proved highly resistant to corrosion and abrasion.
3. Similar cracking was observed in a four-year-old adhesive band, but losses of these bands (which are circular in cross-section) were attributed to faulty fastening rather than to structural failure of the plastic.

Table 26 The recovery rates of Oystercatchers ringed in *Morecambe Bay*, the *Dee Estuary* and *Burry Inlet*

Ringing area	Date	Number ringed	Number recovered	% recovered	Time elapsed *years*	Number of bird-years	Recovery rate *recoveries per 100 bird-years*
Morecambe Bay	23 Nov/2 Dec 1962	100	18	18.0	4.3	430	4.2
	18 Sep 1963	738	39	5.3	3.5	2 583	1.5
	7/21 Oct 1963	144	25	17.4	3.4	490	5.1
	4/9 Oct 1964	137	13	9.5	2.4	329	4.0
Totals		1 119	95	8.5		3 832	2.5
Dee Estuary	27 Sep 1961	152	10	6.6	5.5	836	1.2
	28 Dec 1962	123	17	13.8	4.25	523	3.3
	11 Jan 1963	167	22	13.2	4.2	701	3.1
	27/28 Jan 1963	298	24	8.1	4.2	1 252	1.9
	10 Feb 1963	130	15	11.5	4.2	546	2.7
	9 Mar 1963	102	10	9.8	4.1	418	2.4
	17 Sep 1963	132	14	10.6	3.5	462	3.0
	1 Nov 1963	205	9	4.4	3.4	697	1.3
	15 Nov 1963	423	36	8.5	3.3	1 396	2.6
	22 Oct 1964	571	16	2.8	2.4	1 370	1.2
Totals		2 303	173	7.5		8 201	2.1
Burry Inlet	11 Nov 1962	386	22	5.7	4.3	1 660	1.3
	5 Sep 1963	324	20	6.2	3.6	1 166	1.7
Totals		710	42	5.9		2 826	1.5
Grand totals		4 132	310	7.5		14 859	2.1

Notes
1. Only the recovery rates for individual catches of 100 or more are analysed.
2. All recoveries up to 31 March 1967 have been used; retraps are not included.

APPENDIX II

TABLE 27

RECOVERIES OF BRITISH OYSTERCATCHERS RINGED AS PULLI (FIGURES 1–6)

All usable recoveries which had been notified up to 1 June 1966 are tabulated by the areas of ringing (=birth-places). The following classes of recovery, which cannot be dated at all accurately, are excluded: the finding of a ring only or of a leg bearing a ring, rings found in gulls' pellets, skeletons of ringed birds, and all recoveries before 1 September in the first year of life showing movements of less than 10 miles (see page 11).

The following symbols and terms are employed:

Place of recovery: when shown as 'where ringed' means within approximately one mile of the birthplace.

Date of recovery: where this is unknown the date of the reporting letter is given in italics, and any delays between recovery and reporting are assumed to be short.

Age: ageing is based on a year starting 1 June;
Ad a certain adult, not less than four years old; birds recovered in the spring of their third year may or may not also have been adult (see page 13).

Movement: distances under 20 miles are given to the nearest five miles, all others to the nearest 10 miles; directions are approximate.

Manner of recovery (MR): conventional symbols are employed:

- v caught or trapped, and released with ring;
- v* caught or trapped, and released with ring, breeding;
- + shot or killed by man;
- +* shot or killed by man, breeding;
- x found dead or dying;
- x A found long dead;
- ( ) caught or trapped alive and not released, or released but ring removed;
- /?/ manner of recovery imperfectly known.

Table 27 Recoveries of British Oystercatchers ringed as pulli

Ring number	Birth-place		Date ringed	Recovery place		Date recovered	Year of life	Movement *miles and direction*	MR
RS3808	Orkney	Eynhallow	24 Jun 1931	Lancashire	Lytham St. Annes	15 Sep 1931	1st	380 s	x
306231	Orkney	Eynhallow	15 Jun 1938	Co. Kerry	Dingle	9 Jan 1939	1st	580 sw	x
306240	Orkney	Eynhallow	9 Jun 1938	Co. Antrim	Larne	– Oct 1938	1st	330 ssw	x
315591	Orkney	Eynhallow	21 Jun 1939	Co. Antrim	Belfast	3 Sep 1939	1st	340 ssw	x
344096	Shetland	Fair Isle	24 Jun 1952	Co. Meath	Drogheda	c. 10 May 1954	2nd	400 sw	v
344183	Shetland	Fair Isle	16 Jun 1953	Dumfriesshire	Eastriggs	11 Feb 1954	1st	320 ssw	x
344186	Shetland	Fair Isle	18 Jun 1953	Fife	Elie	4 Jul 1954	2nd	240 ssw	x
344182	Shetland	Fair Isle	14 Jun 1953	Lancashire	Walney Island	28 Feb 1957	4th Ad	380 s	x
344187	Shetland	Fair Isle	18 Jun 1953	Fife	Charlestown	19 Jan 1955	2nd	250 ssw	x
346623	Shetland	Fair Isle	10 Jul 1953	Co. Donegal	Killybegs	30 Jan 1955	2nd	450 sw	x
382213	Shetland	Fair Isle	7 Jun 1955	Glamorgan	Swansea	26 Apr 1956	1st	560 ssw	x
385100	Shetland	Fair Isle	6 Jul 1957	Cheshire	Wirral	8 Feb 1958	1st	430 sse	x
385153	Shetland	Fair Isle	1 Jul 1958	Lancashire	Morecambe	27 Nov 1958	1st	380 s	x
AT67609	Shetland	Fair Isle	18 Jun 1961	Lancashire	Morecambe Bay	c. 19 Aug 1961	1st	380 s	+
AT77290	Shetland	Fair Isle	26 Jul 1961	Anglesey	Rhosneigr	22 Jan 1962	1st	440 ssw	x
337774	Shetland	Fair Isle	24 Jun 1951	*where ringed*		6 Sep 1958	8th Ad	—	x
337780	Shetland	Fair Isle	29 Jul 1951	*where ringed*		– Oct 1951	1st	—	x
AT67617	Shetland	Fair Isle	26 Jun 1961	Dumfriesshire	Powfoot	27 May 1962	1st	310 ssw	x A
SS05253	Shetland	Fair Isle	13 Jul 1963	Lincolnshire	Holbeach marsh	3 Sep 1963	1st	460 s	v
382253	Shetland	Fair Isle	2 Jul 1956	Flintshire	Gronant	1 Nov 1963	8th Ad	440 s	v
AT90952	Shetland	Fair Isle	17 Jun 1963	Lancashire	Heysham	24 Feb 1964	1st	380 s	+
385147	Shetland	Fair Isle	26 Jun 1958	Lancashire	Heysham	3 Mar 1965	7th Ad	380 s	+
				FRANCE					
SS05967	Shetland	Fair Isle	6 Jul 1964	Finistère	Morlaix	11 Sep 1964	1st	770 ssw	+
337622	Shetland	Fair Isle	21 Jun 1951	Gironde	Cap Ferret	21 Aug 1951	1st	1 050 s	+
344125	Shetland	Fair Isle	22 Jun 1952	Loire Inf.	La Plaine	7 Sep 1952	1st	870 s	+
AT90056	Shetland	Fair Isle	26 Jun 1962	Shetland	St. Ninian's Isle	29 Apr 1966	4th Ad	30 N	x
329172	Shetland	Bressay	12 Jun 1948	Carmarthen	Llanelly	27 Aug 1951	4th Ad	600 ssw	x
3018911	Shetland	Fetlar	6 Jul 1957	Cornwall	Millbrook	*16 Nov 1957*	1st	720 ssw	x
3078715	Shetland	Mainland	8 Jun 1961	Cumberland	Maryport	22 Feb 1963	2nd	390 ssw	x
AT78286	Shetland	Mainland	30 Jun 1962	Lancashire	Lytham St. Annes	23 Jan 1963	1st	450 s	x
3086338	Shetland	Mainland	24 Jun 1962	Pembroke	Saundersfoot	30 Mar 1964	2nd	600 ssw	x
				PORTUGAL					
3078719	Shetland	Mainland	14 Jun 1961	Beira-Litoral	Murtosa	c. 8 May 1963	2nd	1 450 ssw	+
3076783	Shetland	Mousa	30 Jun 1961	Lancashire	Walney Island	20 Jul 1964	4th Ad	420 s	x
AT87059	Shetland	Mousa	5 Jul 1962	Angus	Monifieth	24 Oct 1965	4th Ad	250 ssw	x
				NORWAY					
AT80309	Shetland	Foula	8 Aug 1961	Rogaland	Karmöy	*14 May 1965*	4th Ad	260 ese	x
355321	Outer Hebrides	South Uist	23 Jun 1952	Cheshire	Wirral	22 Mar 1953	1st	310 sse	x
				SPAIN					
3086420	Outer Hebrides	South Uist	28 Jun 1962	Santander	Maliaño	10 Oct 1962	1st	950 sse	+
AT99354	Outer Hebrides	Mingulay	2 Aug 1962	Cadiz	Sanlucar	7 Oct 1962	1st	1 400 s	+

359383	Sutherland	Durness	20 Jun 1953	Co. Clare	Lahinch	4 Dec 1958	6th	420 SSE	+
380049	Sutherland	Durness	3 Jul 1957	Co. Kerry	Ventry	5 Jan 1958	1st	500 SSW	+
328480	Sutherland	Durness	30 Jun 1949	Dunbarton	Dumbarton	26 Sep 1950	2nd	180 S	+
3071285	Sutherland	Durness	29 Jun 1961	Cornwall	Godrevy Point	27 Jan 1963	2nd	570 S	x
343416	Sutherland	Roan Island	15 Jul 1949	Lancashire	Lytham St. Annes	10 Apr 1950	1st	340 S	v
3080451	Sutherland	Handa	18 Jun 1963	Galway	Turbot Island	*11 Oct 1963*	1st	380 SW	( )
3039397	Sutherland	R. Naver	5 Jun 1964	Renfrewshire	Langbank	26 Feb 1965	1st	170 S	x
				FRANCE					
3071183	Sutherland	R. Naver	7 Jun 1963	Morbihan	Quiberon	– Dec 1963	1st	750 S	+
8981	Ross-shire	Swordale	3 Jul 1910	Cumberland	Port Carlisle	31 Jan 1914	4th Ad	170 SSE	+
3039344	Ross-shire	Strathcarron	16 Jun 1961	Lancashire	Grange-over-Sands	*10 Apr 1962*	1st	240 SE	+
				FRANCE					
3100004	Ross-shire	Ullapool	21 Jun 1964	Finistère	Camaret	20 Aug 1964	1st	670 S	x
SS34591	Ross-shire	Tarbat Ness	27 Jul 1965	Vendée	l'Aiguillon	*4 Jan 1966*	1st	800 SSE	x
65841	Inverness-shire	Kingussie	28 Jul 1914	Cornwall	Falmouth	15 Sep 1914	1st	490 S	+
3015532	Inverness-shire	Kingussie	9 Jul 1956	Co. Cork	Douglas	12 Dec 1960	5th Ad	400 SW	/?/
RV9608	Inverness-shire	Drumochter	10 Jun 1939	Cheshire	Burton marshes	17 Sep 1939	1st	250 SSE	+
345958	Inverness-shire	Newtonmore	10 Jun 1950	Dumfriesshire	Powfoot	7 Jan 1951	1st	140 S	x
366910	Inverness-shire	Newtonmore	12 Jun 1952	Cheshire	Wirral	7 Mar 1953	1st	240 S	x
393609	Inverness-shire	Newtonmore	20 Jun 1955	*where ringed*		c. 25 Sep 1955	1st	—	x
366924	Inverness-shire	Newtonmore	23 May 1953	Carmarthen	Ferryside	30 May 1954	1st	360 S	x
366938	Inverness-shire	Newtonmore	29 May 1953	Lancashire	Fleetwood	3 Mar 1954	1st	220 S	v
366925	Inverness-shire	Newtonmore	23 May 1953	Co. Galway	Galway	7 Oct 1953	1st	330 SW	+
359993	Inverness-shire	Newtonmore	16 Jul 1951	Co. Mayo	Portacloy	25 Jan 1952	1st	300 SW	x
351983	Inverness-shire	Newtonmore	7 Jun 1951	Inverness-shire	Laggan	c. 20 Mar 1958	7th Ad	5 WSW	x
366846	Inverness-shire	Newtonmore	25 May 1952	Co. Kerry	Tralee Bay	20 Feb 1955	3rd	400 SW	+
369286	Inverness-shire	Newtonmore	30 May 1953	Co. Limerick	Glin	7 Mar 1955	2nd	370 SW	x
369566	Inverness-shire	Newtonmore	23 May 1954	Lancashire	Foulney Island	13 Mar 1955	1st	210 SSE	x
3066813	Inverness-shire	Newtonmore	30 Jun 1960	*where ringed*		*26 Mar 1961*	1st	—	x
3030607	Inverness-shire	Newtonmore	16 Jun 1957	Wigtownshire	Wigtown	14 Aug 1957	1st	150 S	x
3015588	Inverness-shire	Newtonmore	6 Jun 1957	Inverness-shire	Laggan	c. 20 Mar 1964	7th Ad	5 WSW	x
330289	Inverness-shire	Aviemore	5 Jun 1950	Co. Clare	Doonbeg	26 Feb 1954	4th Ad	370 SW	+
390817	Inverness-shire	Aviemore	17 Jun 1958	Co. Kerry	Cahirciveen	30 Aug 1958	1st	530 SW	/?/
				CHANNEL ISLANDS					
3031965	Inverness-shire	Aviemore	1 Jun 1958	Jersey		19 Apr 1959	1st	590 SSE	x
352580	Inverness-shire	Kincraig	31 May 1953	Co. Antrim	Larne	10 Sep 1953	1st	170 SW	x
347110	Inverness-shire	Dunlichity	3 Jul 1950	Co. Louth	Clogherhead	13 Jan 1955	5th Ad	260 SSW	+
359426	Inverness-shire	Moy	11 Jun 1955	Ayrshire	Fairlie	6 Dec 1956	2nd	110 SSW	x
379247	Inverness-shire	Loch Insh	3 Jun 1954	Lancashire	Cockerham	*24 Dec 1957*	4th Ad	220 SSE	/?/
3030603	Inverness-shire	Dalwhinnie	14 Jun 1957	*where ringed*		*30 Sep 1957*	1st	—	x
3025355	Inverness-shire	Strath Nairn	10 Jun 1957	Lancashire	Walney Island	4 May 1958	1st	240 S	x A
3059682	Inverness-shire	Dulnain Bridge	27 May 1959	Inverness-shire	Aviemore	*4 Aug 1961*	3rd	5 S	x
3019622	Inverness-shire	Daviot	22 Jun 1961	Flintshire	Gronant	22 Oct 1964	4th Ad	280 S	v
3015559	Morayshire	Llanbryde	2 Jun 1957	Inverness-shire	Newtonmore	31 Jul 1957	1st	50 SW	x
3066858	Morayshire	Dava	5 Jun 1962	Co. Down	Strangford Lough	2 Sep 1962	1st	210 SW	/?/
RW2199	Banffshire	Carnousie	30 Jun 1946	Lancashire	Leven Estuary	22 Jan 1947	1st	230 S	( )
369584	Banffshire	Craigellachie	20 Jun 1954	Ayrshire	Irvine	9 Apr 1955	1st	140 SW	x
374751	Banffshire	Aberlour	22 May 1955	Co. Waterford	Dungarvan	13 Jan 1956	1st	410 SSW	x
374754	Banffshire	Rothes	16 Jul 1955	Banffshire	Buckie	20 Aug 1955	1st	15 NE	x
3004031	Banffshire	Dufftown	30 Jun 1956	Lancashire	Morecambe Bay	13 Apr 1957	1st	230 S	x
328035	Aberdeenshire	Ellon	30 Jun 1947	Aberdeenshire	Newburgh	25 Oct 1947	1st	5 S	x

Table 27—continued

Ring number	Birth-place		Date ringed	Recovery place		Date recovered	Year of life	Movement *miles and direction*	MR
328029	Aberdeenshire	Udny	9 Jun 1947	Northumberland	Newbiggin	12 Nov 1947	1st	150 s	( )
362627	Aberdeenshire	Grandhome	2 Jun 1952	Kincardineshire	Nigg	24 Jun 1953	2nd	10 SE	x
362629	Aberdeenshire	Grandhome	3 Jun 1952	Fife	Largo	22 Dec 1952	1st	70 SSW	x
3044772	Aberdeenshire	Newburgh	12 Jun 1961	Kirkcudbrightshire	Carsethorn	25 Jan 1963	2nd	170 SSW	x
SS17440	Aberdeenshire	Newburgh	24 Jun 1964	*where ringed*		12 Apr 1965	1st	—	x
24716	Angus	Forfar	2 Jul 1925	Fife	Dalgety Bay	29 Aug 1925	1st	40 s	/?/
320988	Angus	Kirriemuir	6 Jun 1950	Dumfriesshire	Dumfries	10 Oct 1951	2nd	110 s	x
320990	Angus	Glen Clova	13 Jun 1950	Co. Cork	Midleton	10 Feb 1951	1st	420 SW	x
RS1920	Perthshire	Almond Bank	18 Jun 1934	Cheshire	Wirral	13 Apr 1935	1st	220 SSE	x
RW3848	Perthshire	Killiecrankie	15 Jun 1947	Devon	Westward Ho!	23 Nov 1947	1st	400 s	x
RR2222	Perthshire	Shingle	13 Jun 1936	Co. Waterford	Tramore	14 Sep 1936	1st	340 SSW	+
369872	Perthshire	Perth	24 Jun 1956	1. Perthshire	Amulree	*24 Aug 1959*	4th Ad	15 WNW	v
				2. Perthshire	Auchterarder	5 Feb 1961	5th Ad	15 s	x
3071148	Perthshire	Glenshee	23 Jun 1962	Flintshire	Point of Air	9 Mar 1963	1st	210 s	v
				FRANCE					
AT79243	Perthshire	Blair Atholl	17 Jun 1962	Finistère	Morlaix	*20 Sep 1963*	2nd	570 s	x
SS17419	Perthshire	Glen Lyon	19 Jun 1964	Cumberland	Drigg	7 Jun 1965	2nd	160 s	/?/
21318	Kinross	Loch Leven	24 Jun 1924	Lancashire	Fleetwood	7 Feb 1925	1st	170 s	+
329154	Fife	Isle of May	8 Aug 1958	Fife	Largo	18 Sep 1958	1st	15 W	x
346862	Argyll	Loch Awe	18 Jul 1955	Ayrshire	Stevenston	12 Sep 1955	1st	40 SE	( )
3037061	Argyll	Islay	9 Jun 1963	Flintshire	Rhuddlan	18 Jan 1964	1st	200 SE	x
3037056	Argyll	Islay	8 Jun 1963	Co. Down	Dundrum	15 Mar 1965	2nd	100 SE	x
3051253	Bute	Little Cumbrae	19 Jun 1960	Dunbarton	Dumbarton	10 Oct 1960	1st	20 NE	+
347523	Midlothian	Gladhouse	3 Jun 1950	Cheshire	Wallasey	8 Dec 1951	2nd	180 s	x
358061	Midlothian	Gladhouse	31 May 1953	Lancashire	Barrow-in-Furness	6 Mar 1955	2nd	120 s	x
358056	Midlothian	Gladhouse	24 May 1953	Glamorgan	Whiteford Point	4 Dec 1959	7th Ad	290 s	x
349881	Ayrshire	Ballantrae	18 Jun 1950	*where ringed*		– Jul 1952	3rd	—	x
363505	Ayrshire	Horse Island	19 Jul 1953	Ayrshire	Portencross	3 Dec 1954	2nd	5 NW	x
312430	Wigtownshire	Glenluce	18 Jun 1939	Wigtownshire	Sandhead	16 Jul 1940	2nd	10 SW	x
360615	Wigtownshire	Mochrum Loch	28 Jul 1954	Lancashire	Fleetwood	5 Mar 1955	1st	90 SE	x
3017300	Kirkcudbrightshire	Dalry	12 Jun 1957	Lancashire	Fleetwood	15 Mar 1958	1st	90 SE	+
				FRANCE					
AT96224	Kirkcudbrightshire	Dalry	9 Jul 1963	Finistère	Douarnenez	*21 Sep 1964*	2nd	480 s	/?/
3016526	Dumfriesshire	Moniaive	13 Jun 1957	Glamorgan	Penclawdd	*8 Jan 1958*	1st	240 s	x
24065	Cumberland	Rockcliffe	3 Jul 1924	Lancashire	Humphrey Head	2 Dec 1924	1st	40 SSE	( )
25997	Cumberland	Rockcliffe	13 Jun 1925	Dumfriesshire	Dumfries	18 Jan 1926	1st	15 NW	/?/
26015	Cumberland	Rockcliffe	2 Jul 1925	Cumberland	Morecambe Bay	5 Feb 1930	5th Ad	10 SW	/?/
25998	Cumberland	Rockcliffe	13 Jun 1925	Dumfriesshire	Ruthwell	1 Aug 1935	11th Ad	15 W	x
334204	Cumberland	Rockcliffe	24 Jul 1948	Lancashire	Walney Island	– Apr 1949	1st	60 s	x
24068	Cumberland	Kirkbride	10 Jul 1924	Dumfriesshire	Solway Firth	3 Jan 1925	1st	5 N	/?/
29098	Cumberland	Kirkbride	17 Jul 1927	Cumberland	Allonby	28 Sep 1927	1st	20 SW	/?/
RR9985	Cumberland	Kirkbride	7 Jul 1929	Cheshire	Dee Estuary	27 Dec 1929	1st	100 s	+
29094	Cumberland	Kirkbride	17 Jul 1927	Lancashire	Fleetwood	c. 28 Feb 1931	4th Ad	70 s	x
314685	Cumberland	Burgh	10 Jun 1939	Dumfriesshire	Eastriggs	3 Mar 1940	1st	5 NW	x
340384	Cumberland	Burgh	3 Jul 1949	Dumfriesshire	R. Annan-mouth	25 Feb 1950	1st	5 NW	( )
342710	Cumberland	Burgh	22 Jun 1950	Lancashire	Allithwaite	– Oct 1950	1st	50 s	x
3073877	Cumberland	Burgh	4 Jun 1964	Yorkshire	Teesmouth	4 Dec 1965	2nd	80 E	x

305813	Cumberland	Newton Arlosh	14 Jul 1938	*where ringed*		– Oct 1938	1st	—	x
376988	Cumberland	Silloth	25 Jun 1955	Cumberland	Rockcliffe	16 Mar 1964	9th Ad	15 ENE	x
35314	Cumberland	Ravenglass	22 Jun 1925	Lancashire	Askham-in-Furness	14 Jan 1926	1st	15 SE	( )
300113	Cumberland	Ravenglass	– Jul 1937	*where ringed*		10 May 1938	1st	—	x
306477	Cumberland	Ravenglass	26 Jun 1938	*where ringed*		3 Feb 1940	2nd	—	x
306409	Cumberland	Ravenglass	13 Jul 1938	Co. Down	Annalong	8 Feb 1940	2nd	120 W	x
345618	Cumberland	Langwathby	9 Jun 1950	Lancashire	Foulney Island	11 Apr 1955	5th Ad	40 SW	x
350377	Cumberland	Little Salkeld	19 Jun 1952	*where ringed*		17 Sep 1952	1st	—	x
3011558	Cumberland	Lazonby	11 Jun 1956	Lancashire	Lancaster	26 Jan 1957	1st	40 S	+
367560	Cumberland	Edenhall	25 Jun 1952	Lancashire	Flookburgh	c. 3 Mar 1955	3rd	40 SSW	x
				FRANCE					
339378	Cumberland	Eden Valley	22 Jun 1949	Vendée	l'Aiguillon	10 Aug 1949	1st	580 SSE	+
335688	Westmorland	Kendal	1 Jun 1949	Cheshire	Wirral	15 Apr 1950	1st	70 S	x
359106	Westmorland	Kirkby Stephen	11 Jun 1951	Lancashire	Fleetwood	5 Mar 1955	4th Ad	40 SSW	x
367903	Westmorland	Appleby	12 Jun 1952	Cumberland	Bowness-on-Solway	c. 11 May 1955	3rd	40 NW	x
384881	Westmorland	Appleby	14 Jun 1954	Lancashire	Hest Bank	12 Mar 1955	1st	30 SSW	x
384990	Westmorland	Appleby	1 Jun 1955	Lancashire	Bolton-le-Sands	c. 29 Feb 1958	3rd	30 SSW	x
3079492	Westmorland	Appleby	9 Jun 1962	Lancashire	Holker marsh	28 Nov 1962	1st	30 SW	+
3025032	Westmorland	Warcop	24 Jun 1957	Cumberland	Penrith	12 May 1961	4th Ad	10 W	x
366605	Westmorland	Warcop	18 May 1952	Westmorland	Crosby Ravensworth	*7 Mar 1966*	14th Ad	7 W	x
306059	Westmorland	Kirkby Stephen	25 Jun 1960	Westmorland	Helton	30 May 1963	3rd	20 WNW	x
309721	Westmorland	Arnside	3 Jul 1940	*where ringed*		– Jan 1945	5th Ad	—	+
RX8088	Westmorland	Arnside	23 Jul 1946	*where ringed*		9 Sep 1946	1st	—	x
366381	Westmorland	Arnside	20 Jul 1952	Lancashire	Rampside	29 Jan 1955	3rd	15 SW	x
				FRANCE					
327806	Westmorland	Arnside	23 Jun 1957	Manche	Granville	4 Aug 1958	2nd	370 SSE	+
374627	Lancashire	Carnforth	19 Jun 1953	Westmorland	Arnside	21 Mar 1954	1st	5 N	x
AH917	Lancashire	Walney Island	21 Jun 1931	Lancashire	Askham-in-Furness	10 Apr 1934	3rd	5 N	/?/
3080161	Lancashire	Walney Island	24 Jun 1962	Lancashire	Foulney Island	30 Mar 1964	2nd	—	x
3078114	Lancashire	Foulney Island	6 Jul 1962	Lancashire	Piel Island	c. 28 Feb 1963	1st	—	x
3078111	Lancashire	Foulney Island	24 June 1962	*where ringed*		29 Jan 1963	1st	—	x
3095703	Lancashire	Foulney Island	9 Jul 1964	*where ringed*		21 Jan 1966	2nd	—	x
3078113	Lancashire	Foulney Island	6 Jul 1962	1. Lancashire	Walney Island	18 Sep 1963	2nd	—	v
				2. Cheshire	Birkenhead	22 Jan 1964	2nd	40 S	x
39506	Lancashire	Ainsdale	5 Jun 1921	Lancashire	Grange-over-Sands	– Dec 1926	6th Ad	40 NNE	( )
323871	Lancashire	Freshfield	23 Jun 1943	Lancashire	Ainsdale	4 Mar 1944	1st	5 N	x
353506	Lancashire	Formby	17 Jun 1954	Cheshire	Wallasey	20 Mar 1955	1st	10 S	x
66030	Cheshire	Dee Marshes	30 Jun 1917	Cheshire	Shotton	1 Nov 1917	1st	5 SE	+
347906	Yorkshire	Sedbergh	21 May 1951	Northumberland	Berwick	10 May 1953	2nd	110 N	x
361802	Yorkshire	Sedbergh	18 May 1952	Lancashire	Lancaster	3 Apr 1955	3rd	20 SW	x
3036555	Yorkshire	Sedbergh	27 May 1958	Lancashire	Ribchester	*13 Apr 1961*	3rd	30 S	x
327472	Yorkshire	Arncliffe	9 Jun 1963	Lancashire	Heysham	21 Feb 1964	1st	30 W	+
342205	Yorkshire	Spurn Point	28 Jul 1957	Lincolnshire	Holbeach marsh	3 Apr 1961	4th Ad	50 S	v*
AT45501	Northumberland	Farne Island	13 Jul 1956	Northumberland	Embleton	26 Feb 1957	1st	10 S	x
AT6320	Northumberland	Farne Island	14 Jul 1935	*where ringed*		29 Sep 1935	1st	—	x
367604	Northumberland	Thropton	11 Jun 1952	Lancashire	Morecambe	17 May 1953	1st	90 SW	( )
307770	Isle of Man	Andreas	10 Jul 1939	Caernarvonshire	Abersoch	7 Dec 1939	1st	100 S	x
309829	Isle of Man	Rue Point	5 Jul 1939	Carmarthenshire	Ferryside	23 Feb 1940	1st	180 S	+
325698	Isle of Man	Smeale	5 Jul 1944	Isle of Man	Port St. Mary	16 Jan 1945	1st	20 SSW	x
324835	Isle of Man	Smeale	24 Jun 1943	Cornwall	Gorran Haven	12 Feb 1946	3rd	300 S	( )
				FRANCE					
314615	Isle of Man	Smeale	1 Aug 1945	Vendée	l'Aiguillon	1 May 1946	1st	570 SSE	+

Table 27—continued

Ring number	Birth-place		Date ringed	Recovery place		Date recovered	Year of life	Movement *miles and direction*	MR
320714	Isle of Man	The Ayre	12 Jun 1947	Caernarvonshire	Aber	6 Mar 1948	1st	80 s	x
332313	Isle of Man	The Ayre	22 Jun 1947	Co. Wexford	Broadway	– Nov 1947	1st	160 sw	+
				FRANCE					
339123	Isle of Man	The Ayre	8 Jun 1950	Manche	Carentan	19 Oct 1950	1st	370 sse	+
320336	Isle of Man	Ballaghenny	24 Jun 1950	Cornwall	Falmouth	– Nov 1950	1st	300 s	x
314979	Isle of Man	Rue Point	22 Jul 1945	*where ringed*		14 Apr 1952	7th Ad	—	+
3079323	Isle of Man	Andreas	27 Jun 1961	Lancashire	Walney Island	24 Sep 1961	1st	50 ese	x
				FRANCE					
SS00038	Isle of Man	The Calf	21 Jun 1963	Morbihan	Plouharnel	24 Aug 1963	1st	450 sse	+
SS16497	Isle of Man	The Calf	22 Jun 1964	Co. Cork	Kinsale	11 Feb 1966	2nd	220 sw	x
3036316	Co. Down	Copeland Island	15 Jun 1958	Co. Down	Belfast Lough	14 Nov 1959	2nd	5 w	+
3061349	Co. Down	Copeland Island	1 Jul 1961	Co. Down	Helensbay	21 Apr 1963	2nd	10 w	x
				SPAIN					
3042601	Co. Down	Burial Island	23 Jun 1959	Pontevedra	Guardia	4 Oct 1959	1st	910 ssw	/?/
				FRANCE					
3045836	Caernarvonshire	Criccieth	5 Jun 1962	Vendée	l'Aiguillon	30 Sep 1962	1st	470 sse	+
3075172	Caernarvonshire	Bardsey	23 Jun 1960	Caernarvonshire	Morfa Nevin	25 May 1961	1st	15 ne	xA
388494	Caernarvonshire	Bardsey	12 Jun 1957	*where ringed*		10 Aug 1960	4th Ad	—	x
AT86456	Caernarvonshire	Bardsey	2 Jun 1963	Glamorgan	Burry Estuary	*18 Sep 1964*	2nd	80 s	x
				SPAIN					
388502	Caernarvonshire	Bardsey	12 Jun 1957	Coruña	Arteijo	– Aug 1958	2nd	700 ssw	( )
14154	Anglesey	Holy Isle	3 Jun 1911	Anglesey	Malltraeth Bay	22 Dec 1913	3rd	10 se	/?/
3073927	Anglesey	Newborough Warren	27 Jun 1961	Pembrokeshire	Saundersfoot	7 Jan 1962	1st	100 s	v
				SPAIN					
3084916	Anglesey	Newborough Warren	7 Jul 1961	Cadiz	Chipiona	27 Dec 1961	1st	1 150 s	+
				FRANCE					
392731	Anglesey	Newborough Warren	2 Jul 1962	Vendée	l'Aiguillon	4 Nov 1962	1st	490 sse	x
392723	Anglesey	Cefni Estuary	2 Jul 1962	Cornwall	Wadebridge	1 Dec 1962	1st	180 s	x
				FRANCE					
392724	Anglesey	Cefni Estuary	2 Jul 1962	Manche	Granville	*29 Nov 1962*	1st	320 sse	+
3073937	Anglesey	Malltraeth	29 Jul 1961	Caernarvonshire	Portmadoc	– Dec 1964	4th Ad	20 se	x
				FRANCE					
3073939	Anglesey	Malltraeth	29 Jul 1961	Finistère	Morlaix	14 Sep 1962	2nd	320 s	+
329194	Anglesey	Aberffraw	16 Jun 1953	Loire Inf.	Bourgneuf	16 Aug 1953	1st	430 sse	+

AT83475	Anglesey	Valley	4 Jul 1962	Glamorgan	Whiteford Point	20 Nov 1964	3rd	110 s	v
3084901	Anglesey	Valley	1 Jul 1961	Anglesey	Brynsiencyn	11 Aug 1965	5th Ad	15 SE	x
AT96351	Anglesey	Valley	27 Jul 1963	*where ringed*		16 Apr 1964	1st	—	x
AT96196	Anglesey	Valley	30 Jun 1963	*where ringed*		9 Jan 1964	1st	—	x A
AT81475	Anglesey	Dulas Bay	2 Jul 1962	Glamorgan	Gowerton	14 Dec 1963	2nd	120 s	+
AT81476	Anglesey	Dulas Bay	2 Jul 1962	Glamorgan	Loughor Estuary	4 Jan 1964	2nd	120 s	x
3019682	Anglesey	Llanddona	15 Jun 1963	*where ringed*		12 Jan 1964	1st	—	x
SS17356	Pembrokeshire	Skomer Island	17 May 1964	Glamorgan	Whiteford Point	20 Nov 1964	1st	40 E	v
				FRANCE					
AT82894	Pembrokeshire	Skomer Island	26 Jun 1962	Loire Inf.	Mesquer	29 Aug 1962	1st	320 SSE	x
SS17379	Pembrokeshire	Skomer Island	24 May 1964	Finistère	Ile Molene	28 Dec 1965	Ad	230 s	+*
AT82694	Pembrokeshire	Skomer Island	20 Jun 1962	*where ringed*		14 May 1966	4th Ad	—	v*
RW7536	Pembrokeshire	Skokholm	7 Jun 1936	Glamorgan	Swansea	10 Oct 1936	1st	50 E	x
338912	Pembrokeshire	Skokholm	6 Jun 1950	*where ringed*		10 Mar 1952	2nd	—	x
374577	Pembrokeshire	Skokholm	14 Jun 1956	*where ringed*		22 Mar 1963	7th Ad	—	x
339034	Pembrokeshire	Skokholm	9 Jun 1952	*where ringed*		3 Oct 1952	1st	—	x
374576	Pembrokeshire	Skokholm	14 Jun 1956	Pembrokeshire	Skomer Island	11 Jun 1959	4th Ad	—	x
338906	Pembrokeshire	Skokholm	3 Jun 1950	Pembrokeshire	Skomer Island	9 Jul 1959	10th Ad	—	x A
2023141	Pembrokeshire	Skokholm	15 Jun 1959	Pembrokeshire	Skomer Island	21 May 1964	5th Ad	—	v*
20540–5	Pembrokeshire	Skokholm	27 Jun 1960	Pembrokeshire	Skomer Island	20 May 1964	4th Ad	—	v*
2023011	Pembrokeshire	Skokholm	3 Jun 1959	Pembrokeshire	Skomer Island	24 Sep 1959	1st	—	x
303461–	Pembrokeshire	Skokholm	– Jun 1958	1. Pembrokeshire	Skomer Island	6 Jun 1963	5th Ad	—	v*
				2. Pembrokeshire	Skomer Island	16 May 1966	8th Ad	—	v*
3034619	Pembrokeshire	Skokholm	5 Jul 1958	Glamorgan	Whiteford Point	8 Sep 1964	7th Ad	40 E	v
SS23388	Pembrokeshire	Skokholm	24 May 1965	Cornwall	Wadebridge	26 Dec 1965	1st	80 s	x A
				FRANCE					
RS3730	Pembrokeshire	Skokholm	25 Jun 1930	Loire Inf.	Mesquer	12 Sep 1930	1st	320 SSE	+
328952	Pembrokeshire	Skokholm	4 Jun 1947	Finistère	Morlaix	15 Sep 1947	1st	220 SSE	+
329051	Pembrokeshire	Skokholm	18 Jun 1947	Finistère	Point l'Abbé	– Dec 1947	1st	260 s	+
328979	Pembrokeshire	Skokholm	13 Jun 1947	Morbihan	Lorient	6 Jan 1949	2nd	270 SSE	+
338968	Pembrokeshire	Skokholm	15 Jun 1950	Charente Inf.	Ile d'Oléron	11 Feb 1952	2nd	420 SSE	+
354271	Pembrokeshire	Skokholm	28 May 1953	Finistère	Roscoff	– Oct 1954	2nd	220 SSE	+
354320	Pembrokeshire	Skokholm	7 Jun 1953	Charente Inf.		20 Jul 1954	2nd	c. 400 SSE	( )
				SPAIN					
2023385	Pembrokeshire	Skokholm	25 Jun 1959	Coruña	Muros	27 Feb 1961	2nd	650 SSW	+
				FRANCE					
374490	Pembrokeshire	Skokholm	1 Jul 1954	Charente Inf.	Ile d'Oléron	4 Jan 1955	1st	420 SSE	( )
				SPAIN					
354283	Pembrokeshire	Skokholm	31 May 1953	Lugo	Ribadeo	1 Mar 1954	1st	580 SSW	/?/
				FRANCE					
339053	Pembrokeshire	Skokholm	2 Jun 1953	Finistère	Fouessnant	2 Jan 1955	2nd	260 s	+
SS06521	Pembrokeshire	Skokholm	9 May 1963	Manche	Pointe d'Agon	31 Dec 1963	1st	230 SE	+
SS11824	Pembrokeshire	Skokholm	21 May 1964	Finistère	Locquenole	*9 Sep 1964*	1st	220 SSE	( )
SS11871	Pembrokeshire	Skokholm	31 May 1964	Morbihan	Lorient	*10 Jan 1966*	2nd	270 SSE	+
SS06521	Pembrokeshire	Skokholm	9 May 1963	Manche	Pointe d'Agon	31 Dec 1963	Ad	230 SE	+*
28733	Norfolk	Salthouse	12 Jun 1930	Lincolnshire	Spalding	8 Dec 1930	1st	50 WSW	( )
77195	Norfolk	Salthouse	31 Jul 1935	Norfolk	Blakeney	12 Sep 1935	1st	—	+
RW7333	Norfolk	Salthouse	30 Jun 1936	Norfolk	Blakeney	–Oct 1936	1st	—	+

Table 27—continued

Ring number	Birth-place		Date ringed	Recovery place		Date recovered	Year of life	Movement *miles and direction*	MR
				FRANCE					
77219	Norfolk	Salthouse	21 Jun 1934	Loire Inf.	Mesquer	2 Nov 1936	3rd	420 SSW	+
383779	Norfolk	Cley	17 Jun 1955	Lincolnshire	North Cotes	22 Oct 1955	1st	60 NW	x
RV9991	Norfolk	Blakeney Point	16 Aug 1935	*where ringed*		11 Sep 1935	1st	—	x
361887	Norfolk	Blakeney Point	– Jul 1952	*where ringed*		3 Aug 1954	3rd	—	x A
346935(7)	Norfolk	Blakeney Point	18 Jun 1950	Norfolk	Scolt Head	21 Jun 1961	12th Ad	10 W	v
381889	Norfolk	Blakeney Point	27 Jul 1953	Hampshire	Southampton	*30 Jan 1957*	4th Ad	170 SW	x
				FRANCE					
355724	Norfolk	Holkham	4 Aug 1951	Somme	Baie de Somme	24 May 1953	2nd	190 SSE	+
RS2057	Norfolk	Scolt Head	9 Jul 1933	Norfolk	Brancaster	1 Sep 1933	1st	—	+
311188	Norfolk	Scolt Head	10 Jun 1949	Norfolk	Hunstanton	21 Jan 1950	1st	10 WSW	x
335678	Norfolk	Scolt Head	4 Jul 1950	Norfolk	Heacham	7 Sep 1950	1st	10 SW	x
335670	Norfolk	Scolt Head	4 Jul 1950	Norfolk	Heacham	16 Sep 1950	1st	10 SW	x
335676	Norfolk	Scolt Head	4 Jul 1950	Norfolk	Titchwell	2 Sep 1951	2nd	—	x
3011890	Norfolk	Scolt Head	28 Jun 1960	Norfolk	Overy Staithe	*9 Jan 1961*	1st	—	x A
3030573	Norfolk	Scolt Head	1 Jul 1960	Norfolk	Brancaster	16 Oct 1960	1st	—	x
SS07064	Norfolk	Scolt Head	4 Jul 1963	Norfolk	Brancaster	30 Jan 1965	2nd	—	x
3011862	Norfolk	Scolt Head	4 Jul 1958	Norfolk	Titchwell	17 May 1964	6th Ad	—	x
SS07075	Norfolk	Scolt Head	4 Jul 1963	Lincolnshire	Donna Nook	28 Jul 1965	3rd	40 NNW	x
3089158	Norfolk	Scolt Head	4 Jul 1962	Yorkshire	Filey	*1 Jan 1963*	1st	90 NNW	+
3011863	Norfolk	Scolt Head	4 Jul 1958	Kent	Shellness	27 Oct 1963	6th Ad	110 S	x
3030596	Norfolk	Scolt Head	10 Jul 1961	Glamorgan	Porthcawl	1 Jun 1962	1st	200 SW	x
				FRANCE					
383572	Norfolk	Scolt Head	10 Jul 1954	Manche	St. Jean	c. 16 Oct 1954	1st	310 SSW	x
				MOROCCO					
3011851	Norfolk	Scolt Head	1 Jul 1958	Imsouane	31°00′N 9°50′W	26 Dec 1958	1st	c. 1 300 SSW	xA
				HOLLAND					
SS07074	Norfolk	Scolt Head	4 Jul 1963	Noord Holland	Den Helder	18 Apr 1965	2nd	170 E	x
SS00702	Essex	Hamford Water	12 Jun 1963	Kent	Seasalter	c. 23 Jan 1964	1st	40 S	x
3013350	Kent	Stoke	10 Jun 1956	Lincolnshire	Holbeach marsh	14 Jul 1962	7th Ad	100 NNW	v*
				FRANCE					
338459	Hampshire	Beaulieu Estuary	20 Jun 1949	Manche	Bricqueville	8 Aug 1952	4th Ad	120 S	+
3004691	Cornwall	Scilly Isles	30 Jul 1964	*where ringed*		*11 Sep 1964*	1st	—	x
				SPAIN					
3011153	Devon	Lundy	24 Jun 1963	Coruña	Noya	9 Feb 1966	3rd	640 SSW	+

SIGHT RECORDS OF COLOUR-BANDED OYSTERCATCHERS MARKED AS PULLI

Appended here is a summary of the sight records relating to Oystercatchers which had been colour-banded by the M.A.F.F. as chicks. Details of the relevant colour codes on which these records are based are given in Table 24. These observations, all by experienced observers, are in accord with the findings from ringing recoveries.

Shetland

Birds marked on Fair Isle in 1964 were subsequently seen during their first autumn and winter as follows:
Morecambe Bay: at Heysham on five occasions between 28 September 1964 and 3 March 1965 (probably the same individual), and at Walney Island on 8 February 1965.
North Wales: Colwyn Bay on 9 January 1965; Red Wharf Bay, Anglesey, on 10 January 1965; one in *Conway Bay* on 15 September 1965 was in its second year, and one there on 20 November 1966 was in its third year.

North-East Scotland

A bird banded in the eastern highlands in 1965 was seen, during its first autumn, in Red Wharf Bay, Anglesey, on 20 November 1965.

North Lancashire

Birds marked in *Morecambe Bay* or the Lune Valley in 1962–63 were seen, when still in immature plumages, as follows:
Morecambe Bay: at various places, on 31 March 1963, 17 September 1963, 10 October 1963, 7 April 1964 and 9 December 1964.
Dee Estuary: on 22 October 1963, 7 January 1964, 20 February 1964 and 4 May 1964.
North Wales; Colwyn Bay on 12 February 1965.

North Wales

Most of the records undoubtedly refer to birds reared on Anglesey (118 marked, 1962–64) rather than elsewhere (only 18 marked). All were still in immature plumages when observed.
North Wales: five around Anglesey (21 December 1963, 22 December 1963, 27 September 1964, 1 April 1965 and 24 October 1965); six in *Conway Bay* (28 August 1964, 16 March 1965, 30 March 1965, 5 May 1965, 22 July 1965 and 24 August 1965).
Dee Estuary: two records (6 October 1965 and 19 October 1965); probably referring to the same individual.
South Wales: Taf Estuary, Carmarthenshire, on 4 January 1965.

South Wales

Birds banded on Skomer in 1964 were seen on five occasions in the *Burry Inlet*, Glamorgan—twice during the first autumn and winter (on 3 November 1964 and 20 December 1964), once in the second year (14 April 1966) and twice in the third year (24 November 1966).

Norfolk

Birds from those banded at Scolt Head were reported to be frequently present near their birth-places, in Brancaster Harbour, during their first year and later (R. Chestney, pers. comm.).

APPENDIX III

TABLES 28 AND 29

RECORDS ON BREEDING GROUNDS OF OYSTERCATCHERS RINGED IN BRITISH PASSAGE AND WINTERING AREAS (FIGURES 11–14)

Virtually all the records tabulated here relate to birds marked by the M.A.F.F. in five study areas in Wales and western England. The records are divided into two groups: A. ringing recoveries (Table 28), B. sightings of live colour-banded birds (Table 29). The latter group is derived only from fully documented sight records. The dates of colour-banding are given but details of the relevant colour codes are listed elsewhere (Appendix I, Table 23).

The following symbols and terms are employed:

Age at ringing (AR):
- Ad a certain adult, not less than four years old,
- 1 first-year bird,
- Im an older immature, two or three years old.

Date recovered: where unknown the date of the reporting letter is given in italics.

Breeding (recovery) area: this is not necessarily identical with the individual's breeding area—particularly early or late in the season, and on coasts—since some such records might well refer to birds still on passage.

Movement: distances are given to the nearest 10 miles; directions are approximate.

Manner of recovery (MR): conventional symbols are employed:
- v caught or trapped, and released with ring;
- \+ shot or killed by man;
- x found dead or dying;
- x A found long dead;
- /?/ manner of recovery imperfectly known.

Table 28 Recoveries on breeding grounds of Oystercatchers ringed in British passage and wintering areas

Ringing details				Recovery details				
Number	AR	Date	Area	Date	Area		Movement *miles and direction*	MR
					ICELAND, SW			
3019803	Ad	11 Nov 1962	Burry Inlet, Glamorgan	12 Apr 1963	Hafnafjördur		1 070 NW	x
3087910	Ad	11 Nov 1962		*18 Jun 1963*	Outer Hebrides	South Uist	400 NNW	/?/
AT96269	Ad	11 Nov 1962		*10 Aug 1963*	Banffshire	King Edward	410 N	x A
AT96332	Ad	11 Nov 1962		30 Jul 1964	Perthshire	Loch Tay	330 N	x
					FAEROE ISLANDS			
392872	Ad	11 Nov 1962		*7 Jul 1965*	Vágar	Böur	720 NNW	/?/
AT96045	Ad	11 Nov 1962		23 Jul 1965	Vágar	Midvágur	720 NNW	x
SS01383	Ad	5 Sep 1963		21 Apr 1964	Banffshire	Forglen	410 N	x
SS01369	Ad	5 Sep 1963		– Jun 1964	Shetland (Yell)	Gutcher	640 N	x
AT96406	Ad	5 Sep 1963		30 Jun 1964	Aberdeenshire	Drumoak	380 N	x
AT96375	Ad	5 Sep 1963		*20 Jul 1964*	Outer Hebrides	North Uist	420 N	x
AT96436	Ad	5 Sep 1963		*18 Aug 1964*	Aberdeenshire	Ythan Wells	400 N	x
SS01374	Ad	5 Sep 1963		summer 1964	Ross-shire	upper Strath Carron	420 N	x A
					HOLLAND			
AT96336	Im	11 Nov 1962		26 Mar 1966	Friesland	Wyldemerk	425 ENE	x
392878	Ad	11 Nov 1962		31 Mar 1966	Westmorland	Appleby	215 NNE	x
AT96013	Ad	11 Nov 1962		19 Jul 1966	Wigtownshire	Portpatrick	225 N	x A
AT96292	Ad	11 Nov 1962		c. 29 Jul 1966	Aberdeenshire	Turriff	415 NNE	x
SS01336	Ad	5 Sep 1963		c. 25 Aug 1966	Ayrshire	Crosshill	255 N	x
392764	Ad	18 Oct 1962	Exe Estuary, Devon	*14 May 1964*	Perthshire	Glenshee	430 N	x
					NORWAY			
AT96943	Ad	5 Nov 1963		*16 Jun 1965*	Møre og Romsdal	Harøy	970 NNE	x
AT96938	Ad	5 Nov 1963		*20 Apr 1966*	Shetland	Papa Stour	675 N	x A
					FAEROE ISLANDS			
3019721	Im	8 Dec 1956	Conway Bay, Caernarvonshire	19 Mar 1957	Vágar	Midvágur	610 NNW	x
SS10915	Ad	25 Aug 1964		7 Jun 1965	Orkney	South Ronaldsay	380 N	x
					FAEROE ISLANDS			
SS17499	Im	25 Aug 1964		10 Jun 1965	Streymoy	Streymnes	620 NNW	x
					ICELAND, SW			
SS38690	Ad	21 Nov 1964		3 Jul 1965	Arnessýsla	Thjórsárdalur	900 NW	x
SS01299	Ad	13 Mar 1963		*3 Mar 1966*	Morayshire	Lossiemouth	300 N	x
					FAEROE ISLANDS			
SS17490	Ad	13 Aug 1964		9 Apr 1966	Eysturoy	Leirvík	620 NNW	x

SS38684	Ad	21 Nov 1964		9 Apr 1966	Aberdeenshire	Huntly	295 N	x
392516	Ad	13 Sep 1958	Dee Estuary, Cheshire/Flintshire	c. 27 Jun 1962	Aberdeenshire	Meikle Wartle	270 N	x A
AT74134	Ad	27 Sep 1961		*14 Jul 1964*	Orkney (Pomona)	Costa Head	400 N	x
AT88261	Ad	7 Feb 1963		*19 Apr 1963*	Aberdeenshire	Inverurie	260 N	x
AT88390	Ad	10 Feb 1963		23 Jun 1963	Orkney	South Ronaldsay	370 N	x
AT74455	Ad	11 Jan 1963		*31 Jul 1963*	Angus	Memus	230 N	x
					FAEROE ISLANDS			
SS01255	1	9 Mar 1963		14 Aug 1963	Suduroy	Tvöroyri	580 NNW	x
SS01072	Im	28 Jan 1963		14 Mar 1964	Aberdeenshire	R. Dee	260 N	x
AT74475	Ad	11 Jun 1963		c. 15 Mar 1964	Orkney	Auskerry	390 N	x
AT88495	Ad	24 Feb 1963		22 Apr 1964	Angus	Cortachy	230 N	x
SS14499	Ad	15 Nov 1963		25 Apr 1964	Aberdeenshire	Ballogie	250 N	x
					NORWAY			
SS14128	Ad	15 Nov 1963		1 May 1964	Møre og Romsdal	Rekdal	770 NNE	x
AT88695	Ad	17 Sep 1963		*14 May 1964*	Perthshire	Glenshee	240 N	x
					FAEROE ISLANDS			
SS14576	Ad	17 Jan 1964		19 May 1964	Vágar	Oknadalur	610 NNW	x
SS14445	Ad	15 Nov 1963		25 May 1964	Banffshire	Durn Hill	300 N	x
AT88089	Ad	27 Jan 1963		31 May 1964	Orkney (Pomona)	Sandwick	390 N	x
AT88417	Ad	13 Feb 1963		c. 27 Jun 1964	Aberdeenshire	Fortrie	280 N	x
AT88262	Ad	7 Feb 1963		*8 Jul 1964*	Orkney	Shapinsay	390 N	x
SS14479	Ad	15 Nov 1963		11 Jul 1964	Aberdeenshire	Fyvie	280 N	x
					FAEROE ISLANDS			
SS14421	Ad	15 Nov 1963		15 Aug 1964	Kalsoy	Mikladalur	620 NNW	x
					ICELAND, SE			
SS01024	Im	28 Jan 1963		– Sep 1964	Hof		890 NW	x
AT88365	Ad	10 Feb 1963		*4 Mar 1965*	Outer Hebrides	Butt of Lewis	370 N	x
3019699	Im	17 Oct 1963		11 Apr 1965	Argyll	Kilmelford	220 NNW	x
SS14737	Ad	22 Oct 1964		c. 23 Apr 1965	Aberdeenshire	Drumoak	260 N	x
SS14674	Im	22 Oct 1964		5 May 1965	Orkney	Sanday	410 N	x
AT88021	Ad	11 Jan 1963		*17 May 1965*	Orkney	Hoy	380 N	x
AT88871	Ad	1 Nov 1963		18 May 1965	Morayshire	Lossiemouth	300 N	x
					NORWAY			
SS14378	Ad	15 Nov 1963		26 May 1965	Møre og Romsdal	Rovde	720 NNE	x
					FAEROE ISLANDS			
SS14200	Ad	15 Nov 1963		1 Jun 1965	Nólsoy		600 NNW	x
AT88212	Ad	28 Jan 1963		2 Jun 1965	Kalsoy	Lorvík	620 NNW	x A
					NORWAY			
SS14475	1	15 Nov 1963		21 Jun 1965	Rogaland	Bryne	520 NE	x
AT88311	Ad	10 Feb 1963		*23 Jun 1965*	Ross-shire	Tain	310 N	x
SS01183	1	9 Mar 1963		*27 Jul 1965*	Aberdeenshire	Culsalmond	280 N	x
AT88008	Ad	11 Jan 1963		4 Aug 1965	Shetland	Papa Stour	480 N	x
AT88698	Im	17 Sep 1963		*25 Aug 1965*	Westmorland	Appleby	80 NNE	x

Table 28—continued

Ringing details				Recovery details				
Number	AR	Date	Area	Date	Area		Movement *miles and direction*	MR
					ICELAND, S			
SS14817	Ad	22 Oct 1964		2 Jul 1965	Skaftafellssýsla	Krókur	890 NW	x
					FAEROE ISLANDS			
SS22419	Ad	26 Sep 1965		28 Mar 1966	Streymoy	Streymnes	610 NNW	x
AT88799	Im	17 Oct 1963		31 Mar 1966	Eysturoy	Oyndarfjördur	620 NNW	x
SS01117	Ad	28 Jan 1963		3 Apr 1966*	Angus	Fletcherfield	230 N	x
					FAEROE ISLANDS			
3104385	Ad	25 Sep 1965		4 Apr 1966	Sandoy	Husavík	600 NNW	x
AT88094	Ad	27 Jan 1963		5 Apr 1966	Streymoy	Kollafjördur	610 NNW	x
SS14570	Im	17 Jan 1964		5 Apr 1966	Streymoy	Hvalvík	610 NNW	x
SS15733	Ad	6 Nov 1964		7 Apr 1966	Dumfriesshire	Moniaive	125 N	x
					NORWAY			
SS15736	Ad	6 Nov 1964		8 Apr 1966	Rogaland	Karmøy	520 NE	x
					FAEROE ISLANDS			
SS15512	Ad	22 Oct 1964		17 Apr 1966	Vágar	Bösdalafossur	610 NNW	x
AT88716	Ad	17 Sep 1963		21 Apr 1966	Suduroy	Tvöroyri	580 NNW	x
					NORWAY			
AT88555	Im	26 Jun 1963		*8 May 1966*	Møre og Romsdal	Rundøy	720 NNE	x
AT88482	Ad	13 Feb 1963		*20 May 1966*	Perthshire	Loch Rannoch	230 N	x A
SS40761	Ad	20 Dec 1965		*15 Jun 1966*	Shetland (North Roe)	Sand Voe	510 N	x
					FAEROE ISLANDS			
SS01220	Im	9 Mar 1963		– May 1966	Streymoy	Kollafjördur	610 NNW	x
SS14868	Im	22 Oct 1964		*14 Jul 1966*	Streymoy	Tørshavn	600 NNW	x
AT88443	Ad	13 Feb 1963		12 Aug 1966	Northumberland	Corbridge	120 NE	x
SS01085	Ad	28 Jan 1963		spring 1966	Aberdeenshire	New Pitsligo	300 NNE	x
			Morecambe Bay, Lancashire					
AT96666	Ad	18 Sep 1963	*a. Walney Island*	*30 Mar 1964*	Wigtownshire	Dunragit	90 NW	x
AT96631	Ad	18 Sep 1963		*25 Apr 1964*	Morayshire	Birnie	250 N	x
					NORWAY			
AT96667	Ad	18 Sep 1963		18 May 1964	Rogaland	Boknafjord	480 NE	/?/
SS01683	Ad	18 Sep 1963		24 May 1964	Orkney (Pomona)	Bay of Skaill	340 N	x
SS01991	Ad	18 Sep 1963		13 Jun 1964	Orkney (Pomona)	Sandwick	340 N	v
					FAEROE ISLANDS			
SS01887	Ad	18 Sep 1963		19 Jul 1964	Nólsoy		550 NNW	/?/

SS01594	Ad	18 Sep 1963		c. 17 Mar 1965	Perthshire	Coupar Angus	170 N	x
SS01984	Ad	18 Sep 1963		24 Mar 1965	ICELAND, SW Akranes		970 NW	+
SS01914**	Ad	18 Sep 1963		31 May 1965	FAEROE ISLANDS Eysturoy	Nordskáli	570 NNW	x
SS01830	Ad	18 Sep 1963		5 Jun 1965	NORWAY Nordland	Ormøy	950 NE	x
SS01806	Ad	18 Sep 1963		14 Jul 1965	FAEROE ISLANDS Suduroy	Hov	520 NNW	x
SS01711	Ad	18 Sep 1963		20 Aug 1965	Suduroy	Vágur	520 NNW	x
AT96594	Ad	18 Sep 1963		– Jul 1965	ICELAND, NW Isafjördursýsla	Holl	1 100 NW	x A
SS01583	Ad	18 Sep 1963		7 May 1966	Cumberland	Bootle	19 NNW	v
AT96529	Ad	18 Sep 1963		c. 15 May 1966	FAEROE ISLANDS Streymoy	Tórshavn	550 NNW	x
SS01532	Ad	18 Sep 1963		*7 Aug 1966*	Shetland (Unst)	Loch of Cliff	475 N	x A
SS17327	Ad	21 Mar 1964	*b. Heysham*	20 Mar 1965	Outer Hebrides (Lewis)	North Tolsta	320 NNW	x
3087962	Ad	23 Nov 1962	*c. Flookburgh sands*	5 Jul 1963	Shetland (Mainland)	Scalloway	410 N	x
3087961	Ad	23 Nov 1962		summer 1963 or 28 Jun 1964	FAEROE ISLANDS Streymoy	Tórshavn	550 NNW	v
AT96102	Ad	2 Dec 1962		4 Apr 1964	Orkney	Papa Westray	350 N	x
AT96086	Ad	29 Nov 1962		8 Oct 1964	FAEROE ISLANDS Suduroy	Frodba	530 NNW	x
AT96839	Ad	18 Oct 1963		11 Mar 1965	Aberdeenshire	Dyce	210 N	x
AT96120	Ad	12 Feb 1963		*12 Jun 1965*	Morayshire	Findhorn Bay	240 N	x
SS17224	Ad	18 Jan 1964		8 Jul 1965	Aberdeenshire	Tarves	220 N	x
AT96846	Ad	19 Oct 1963		17 Jul 1965	Orkney	Westray	360 N	x
SS10994	Ad	6 Oct 1964		5 Aug 1965	FAEROE ISLANDS Bordoy	Klakksvík	570 NNW	x
SS38769	Ad	4 Dec 1964		22 Mar 1966	GERMANY North Friesland Islands	Sylt	460 E	x
AT96862	Ad	20 Oct 1963		19 Apr 1966	FAEROE ISLANDS Sandoy	Sandur	540 NNW	v
AT96052	Ad	26 Nov 1962		c. 16 May 1966	Suduroy	Hvalba	530 NNW	x
SS38784	Im	4 Dec 1964		28 May 1966	Nólsoy		550 NNW	x

Table 28—continued

Ringing details				Recovery details				
Number	AR	Date	Area	Date	Area		Movement *miles and direction*	MR
AT96084	Ad	29 Nov 1962		*27 Jun 1966*	Cumberland	Irton	25 NW	x
YD0213†	Im	24 Feb 1957		21 Mar 1961	Aberdeenshire	Kinaldie	370 N	x
YD0223†	Im	24 Feb 1957		9 Aug 1961	ICELAND, SW Vodmúlastadir		1 050 NW	x
AT74097	Ad	12 Aug 1960	The Wash, Lincolnshire	*19 Apr 1965*	NORWAY Rogaland	Jaeren	470 NNE	/?/
AT74075	Ad	12 Aug 1960		*11 Jun 1965*	Aberdeenshire	Ellon	320 NNW	x
353384	Ad	6 Sep 1964		15 Jun 1965	NORWAY Møre og Romsdal	Harøy	750 NNE	x
AT83176	Im	17 Aug 1962		*23 May 1966*	Rogaland	Karmøy	500 NNE	x
AT83199	Im	3 Sep 1963		8 Jun 1966	Møre og Romsdal	Smøla	780 NNE	x
EC31024	Im	3 Sep 1963		c. 6 Aug 1966	Møre og Romsdal	Leinøy	730 NNE	/?/

Notes

* Finder reported that this bird had bred in the same field also in 1963, 1964 and 1965; recognized by its colour-bands.

** ex Copenhagen 480649, ringed originally 12 July 1960 as pullus on Mykines, Faeroe Islands.

† These two experimental birds were caught at Flookburgh and transported to the Severn Estuary, Glos., where they were released the same day by E. J. M. Buxton.

Table 29 Sightings on breeding grounds of live colour-banded Oystercatchers ringed in British passage and wintering areas

Date or batch colour-banded	Winter (colour-banding) area	Date observed	Breeding (observation) area	Status	Movement *miles and direction*	Observer
20 Aug/30 Nov 1963	*Burry Inlet, Glamorgan*	4 Apr 1964	Aberdeenshire, Braemar	Paired	370 N	J. D. Goss-Custard
20 Aug/30 Nov 1963		5 Apr 1965	Aberdeenshire, Newburgh	In field	400 NNE	J. D. Goss-Custard
20 Aug/30 Nov 1963		12 Jun 1965	Angus, Glen Esk, Tarfside	Breeding	370 NNE	A. J. Mercer
20 Aug/30 Nov 1963		14 Jun 1965	Perthshire, Glen Dochart, Ardchyl		330 N	A. J. Mercer
20 Aug/30 Nov 1963		15 Jun 1965	Lanarkshire, Duneaton Water, Crawfordjohn	Breeding	270 N	A. J. Mercer
20 Aug/30 Nov 1963		15 Jun 1965	Lanarkshire, Duneaton Water, Crawfordjohn	pair	270 N	A. J. Mercer
20 Aug/30 Nov 1963		16 Jun 1965	Dumfriesshire, Crawick Water, Slough Hill	Paired	260 N	A. J. Mercer
20 Aug/30 Nov 1963		16 Jun 1965	Ayrshire, R. Stinchar, Barr		250 N	A. J. Mercer
20 Aug/30 Nov 1963		17 Jun 1965	Kirkcudbrightshire, Dalry	Breeding	250 N	A. J. Mercer
20 Aug/30 Nov 1963		3 May 1966	Shetland, Fair Isle	In flock	560 N	R. H. Dennis
20 Aug/30 Nov 1963		15 Jul 1966	Aberdeenshire, Ythan Estuary	In flock	280 N	P. B. Heppleston
25 Aug 1964		16 Jun 1965	Ayrshire, R. Stinchar, Barr		250 N	A. J. Mercer
15 Oct/19 Oct 1962	*Exe Estuary, Devon*	– May 1963	Co. Wexford, Great Saltee Island	Occupying same	170 NW	D. B. Cabot
15 Oct/19 Oct 1962		– May 1964	Co. Wexford, Great Saltee Island	breeding territory	170 NW	D. B. Cabot
15 Oct/19 Oct 1962		1965–66	Co. Wexford, Great Saltee Island	each year	170 NW	D. B. Cabot
15 Oct/19 Oct 1962 or 3 Nov/9 Nov 1963		10 Jun 1965	FAEROE ISLANDS, Vágar, Sorvágur	In flock	800 NNW	P. J. Dare
3 Nov/9 Nov 1963		16 Jun 1965	Dumfriesshire, Cluden Water, New Bridge	Breeding	310 N	A. J. Mercer
11 Sep/15 Sep 1964	*Conway Bay, Caernarvonshire*	1965–66	Anglesey, Menai Straits	Breeding	10 W	A. J. Mercer
21 Oct 1964		2 Jun 1965	FAEROE ISLANDS, Sandoy, Skopun	In flock	600 NNW	P. J. Dare
21 Nov 1964		30 May 1965	FAEROE ISLANDS, Sandoy, Tradir	Breeding	600 NNW	P. J. Dare
13 Aug/3 Sep 1964		5 Jul 1966	ICELAND, SW, Ytri-Skógar, 63°32′N 19°31′W	Breeding	900 NW	Dr. R. C. Clement (U.S.A.)
27 Sep 1961	*Dee Estuary, Cheshire/ Flintshire*	26 May 1965	FAEROE ISLANDS, Streymoy, Havnardalur	Breeding	600 NNW	P. J. Dare
28 Dec 1962/10 Jan 1963		16 Jul 1963	Perthshire, Spittal of Glenshee	Breeding	240 N	P. J. Dare
28 Dec 1962/10 Jan 1963		6 Apr 1964	Aberdeenshire, Braemar	Paired	250 N	J. D. Goss-Custard
28 Dec 1962/10 Jan 1963		1964–66	Cumberland, Ravenglass	Breeding	70 N	M. Norton-Griffiths
28 Dec 1962/10 Jan 1963		2 Apr 1965	Caernarvonshire, Bardsey Island	Paired	80 WSW	C. J. Mead
28 Dec 1962/10 Jan 1963		7 Jun 1965	FAEROE ISLANDS, Eysturoy, Toftavatn	Breeding	610 NNW	P. J. Dare
11 Jan/10 Feb 1963		1965–66	Shetland, Fair Isle	Paired	420 N	R. H. Dennis
27 Jan/28 Jan 1963		10 Jul 1963	FAEROE ISLANDS, Nólsoy	Breeding	600 NNW	per N. O. Preuss
27 Jan/28 Jan 1963		– Jun 1963	Shetland, Mainland, Petta Water	Breeding	480 N	C. Booth
27 Jan/28 Jan 1963		24 May 1965	FAEROE ISLANDS, Streymoy, Glyvursnes	Breeding	600 NNW	P. J. Dare
27 Jan/28 Jan 1963		8 Jun 1965	FAEROE ISLANDS, Nólsoy	Breeding	600 NNW	P. J. Dare
27 Jan/28 Jan 1963		9 Jun 1965	FAEROE ISLANDS, Vágar, Midvágur	Breeding	610 NNW	P. J. Dare
7 Feb/13 Feb 1963		9 Jun 1965	FAEROE ISLANDS, Vágar, Midvágur	Breeding	610 NNW	P. J. Dare
9 Mar 1963		14 May 1963	Shetland, Fair Isle	Breeding	420 N	P. E. Davis
9 Mar 1963		6 Apr 1964	Shetland, Fair Isle	same bird?	420 N	R. H. Dennis
26 Jun 1963		4 Jun 1965	FAEROE ISLANDS, Eysturoy, Eidi	In flock	620 NNW	P. J. Dare
26 Jun 1963		11 Jun 1965	Angus, Glen Isla, Dykend	Paired	230 N	A. J. Mercer
17 Sep/17 Oct 1963		14 Jun 1964	Lancashire, Lune Valley, Tunstall	Breeding	60 NNE	P. J. Dare
17 Sep/17 Oct 1963		9 Jun 1965	FAEROE ISLANDS, Vágar, Midvágur	Breeding	610 NNW	P. J. Dare

Table 29—continued

Date or batch colour-banded	Winter (colour-banding) area	Date observed	Breeding (observation) area	Status	Movement *miles and direction*	Observer
1 Nov/15 Nov 1963		28 Mar 1964	Sutherland, Melvich	?	360 N	D. M. Stark
1 Nov/15 Nov 1963		18 Jun 1964	Ayrshire, R. Stinchar, Barr	Breeding	140 NW	P. J. Dare
1 Nov/15 Nov 1963		28 Jun 1964	Inverness-shire, R. Findhorn, Tomatin	In flock	280 N	P. J. Dare
1 Nov/15 Nov 1963		4 Jun 1965	Faeroe Islands, Eysturoy, Eidi	In flock	620 NNW	P. J. Dare
1 Nov/15 Nov 1963		9 Jun 1965	Faeroe Islands, Vágar, Midvágur	Breeding	610 NNW	P. J. Dare
1 Nov/15 Nov 1963		18 Jun 1965	Dumfriesshire, Water of Ae, Templand	Breeding	120 N	A. J. Mercer
22 Oct 1964		20 Jul 1966	Faeroe Islands, Suduroy, Hov	Breeding	580 NNW	Mrs. D. Watson
22 Oct 1964		1965–66	Orkney, Eynhallow	On territory	400 N	G. M. Dunnet
22 Oct 1964		30 May 1965	Faeroe Islands, Sandoy, Dalur	Breeding	600 NNW	P. J. Dare
22 Oct 1964		9 Jun 1965	Faeroe Islands, Vágar, Midvágur	Breeding	610 NNW	P. J. Dare
1 Nov/15 Nov 1963		14 Jun 1966	Aberdeenshire, Ythan Estuary	?	280 N	P. B. Heppleston
6 Nov 1964		27 May 1965	Faeroe Islands, Sandoy, Sandsvatn	Breeding	600 NNW	P. J. Dare
18 Sep 1963	*Morecambe*	1964	Lancashire, Walney Island	Breeding	–	P. J. Dare
18 Sep 1963	*Bay,*	1965	Lancashire, Walney Island	6 breeding birds	–	P. J. Dare, H. Tickle
18 Sep 1963	*Lancashire*	9 Aug 1965	Shetland, Mainland, Sumburgh	?	400 N	D. A. Cooke
18 Sep 1963		24 May 1965	Faeroe Islands, Streymoy, Glyvursnes	Breeding	550 NNW	P. J. Dare
18 Sep 1963		27 May 1965	Faeroe Islands, Sandoy, Sandsvatn	In flock	540 NNW	P. J. Dare
18 Jan/17 Mar 1964		– Mar 1965	Shetland, Yell, Gutcher		450 N	R. J. Tulloch
18 Jan/17 Mar 1964		1965–66	Shetland, Mainland, Gunnister	Breeding	430 N	E. Gardiner
18 Jan/17 Mar 1964		24 May 1965	Faeroe Islands, Streymoy, Glyvursnes	Breeding	550 NNW	P. J. Dare
18 Jan/17 Mar 1964		3 Jun 1965	Faeroe Islands, Streymoy, Tórshavn	In flock	550 NNW	P. J. Dare
18 Jan/17 Mar 1964		6 Jun 1965	Faeroe Islands, Eysturoy, Fuglafjördur	Breeding	570 NNW	P. J. Dare
18 Jan/17 Mar 1964		9 Jun 1965	Faeroe Islands, Vágar, Midvágur	Breeding	560 NNW	P. J. Dare
23 Nov 1962/15 Feb 1963		8 Jul 1966	Faeroe Islands, Sandoy, Gróthusvatn	In flock	540 NNW	R. G. Gibbs

APPENDIX IV

TABLES 30–33

RECOVERIES IN THE BRITISH ISLES OF FOREIGN-RINGED OYSTERCATCHERS (FIGURES 7–10)

For explanation of symbols and terms used, see Appendix III

Table 30 Recoveries in the British Isles of Icelandic Oystercatchers ringed as pulli (Figure 7)

Ringing details			Recovery details				
Ring number		Date	Date	Place		MR	Year of life
Reykjavik	4447	19 Jul 1934	21 Apr 1935	Pembrokeshire	Saundersfoot	x	1st
	4992	14 Jun 1937	mid Sep 1937	Midlothian	Musselburgh	x	1st
	4996	19 Jun 1937	mid Nov 1937	Lancashire	Heysham	+	1st
	4999	26 Jun 1937	5 Oct 1938	Lancashire	Lancaster	+	2nd
	41082	13 Jul 1940	– Jan 1941	Co. Donegal	Annagary	+	1st
	4261	8 Jul 1937	14 Jan 1948	Outer Hebrides	North Uist	/?/	11th
	42293	5 Jul 1947	17 Feb 1948	Outer Hebrides	Lewis	/?/	1st
	4838*	23 Jun 1956	1 Jan 1960	Argyllshire	Glenacardoch Point	x	–
	54429	24 Jun 1959	15 Oct 1959	Co. Cork	Bantry	x	1st
	55821	9 Jun 1957	c. 21 Oct 1959	Co. Galway	Ard	+	3rd
	54732	7 Jun 1954	16 Aug 1960	Co. Antrim	Toomebridge	+	7th
	54024	18 Jun 1959	May/June 1961	Cornwall	Truro	x	3rd
	55067	22 Jun 1958	*1.* 5 Sep 1963	Glamorgan	Burry Inlet	v	6th
			2. 17 Aug 1966	Glamorgan	Burry Inlet	+	9th
	410204	2 Jun 1964	*6 Jan 1965*	Co. Donegal	Ardara	x	1st

Notes
* Ringed as adult.
1. All recoveries are between August and April.
2. Of the 13 birds ringed as pulli, 7 were recovered in the 1st year, one in 2nd, two in 3rd, and one each in 7th, 9th and 11th years.

Table 31 Recoveries in the British Isles and other countries of Faeroese Oystercatchers ringed as pulli (Figure 8)

Ringing details			Recovery details				
Ring number		Date	Date	Place		MR	Year of life
Pedersen	51202	8 Jul 1923	4 Nov 1923	Pas de Calais	Calais	+	1st
	1377	17 Jul 1924	20 Jan 1925	Co. Mayo	Ballina	/?/	1st
	4322	12 Jul 1924	16 Dec 1929	Cheshire	Dee Estuary?	/?/	6th
London	323675	3 Jun 1942	23 Mar 1943	Caithness	Thurso	x	1st
	324447	30 Jun 1943	– Nov 1944	Co. Donegal	Bundoran	/?/	2nd
	324286	1 Jun 1944	15 Dec 1944	Co. Down	Holywood	x	1st
	324599	29 Jun 1945	4 Oct 1945	Co. Antrim	Greencastle	+	1st
	324556	8 Jul 1945	1 Jan 1946	Co. Down	Portavogie	+	1st
	324407	2 Jun 1943	5 Jan 1946	Co. Down	Greencastle	+	3rd
	324375	14 Jun 1945	15 Jan 1947	Lancashire	Leven Estuary	+	2nd
Copenhagen	492401	28 Jun 1947	11 Oct 1947	Ayrshire	Skelmorlie	/?/	1st
	492201	18 Jun 1947	9 Nov 1947	Co. Louth	Ravensdale	/?/	1st
	494105	12 Jul 1949	26 Dec 1949	Cheshire	Heswall	/?/	1st
	595753*	20 Jun 1949	14 Jan 1951	Wigtownshire	Luce Bay	x	–
	595814	8 Jul 1951	c. 26 Oct 1951	Co. Antrim	Belfast	v	1st
	595807	8 Jul 1951	12 Apr 1952	Orkney	Birsay	x	1st
	586901	30 Jun 1957	19 Aug 1963	Co. Antrim	Belfast Lough	+	7th
	480649	12 Jul 1960	18 Sep 1963	Lancashire	Walney Island	v	4th

Notes
* Ringed as adult.
1. All recoveries are between August and April; majority between October and January.
2. Of the 17 birds ringed as pulli, 11 were recovered in the 1st year, two in 2nd, and one each in 3rd, 4th, 6th and 7th years.

Table 32 Recoveries in the British Isles of Norwegian Oystercatchers ringed as pulli (Figure 9)

Ringing details			Recovery details				
Ring number		Date	Date	Place		MR	Year of life
Stavanger	42236	27 Jun 1948	3 Jul 1950	Cornwall	Padstow	x	2nd
	54205*	15 Oct 1951	4 Jan 1953	Norfolk	Hunstanton	/?/	2nd
	523912	26 Jun 1959	30 Apr 1960	Cheshire	Dee Estuary	x	1st
	539202	8 Jul 1963	24 Dec 1963	Denbighshire	Rhos-on-Sea	x	1st
	534498	22 Jun 1963	22 Jan 1964	Lancashire	Heysham	+	1st
	540656	5 Jul 1963	26 Apr 1964	Lancashire	Morecambe	x	1st
	541163	2 Jul 1964	19 Sep 1965	Morayshire	Burghead	x	2nd

* Ringed as 1st autumn immature on passage at Revtangen; very probably of Norwegian origin.

Table 33 Recoveries in the British Isles of Oystercatchers ringed in Holland, Germany and Denmark

Ringing details			Recovery details				
Ring number		Date	Date	Place		MR	Year of life
A. Ringed as pulli in Holland (Figure 10)							
Leiden	182395	10 Jul 1950	11 May 1951	Lancashire	Lytham St. Annes	x	1st
Leiden	212903	18 Jul 1951	c. 12 Feb 1953	Yorkshire	Humber Estuary	x	2nd
Leiden	61322	22 Jun 1929	1 Dec 1957	Suffolk	Pakefield	+	29th
Leiden	207775	3 Jun 1961	9 Jan 1962	Sussex	Selsey Bill	x	1st
Arnhem	4021113	16 Jun 1964	20 Mar 1965	Devon	Plym Estuary	x	1st
B. Ringed as adults in Holland							
Leiden	4008266	29 Oct 1960	26 Jun 1961	Shetland	Cunningsburgh	x	–
Leiden	4008274	29 Oct 1960	21 Nov 1961	Lancashire	Flookburgh	+	–
Leiden	4008340	22 Sep 1961	27 Jan 1963	Kent	Greatstone-on-Sea	x	–
Bruxelles	E 0357	1 Nov 1962	22 Feb 1963	Suffolk	Outer Gabbard LV*	x	–
C. Ringed as pullus in Germany (Sylt)							
Helgoland	672	– Jul 1912	1 Mar 1922	Glamorgan	near Cardiff	/?/	10th
D. Ringed as adult, at the nest, in Denmark (Saltholm)							
Copenhagen	482033	15 May 1958	31 Mar 1963	Essex	Clacton-on-Sea	x	–

Notes
The recovery date of Leiden 4008266 strongly suggests breeding in Shetland, i.e. probably a native of Shetland.
* The Outer Gabbard Light Vessel is situated 30 miles east of Felixstowe.

APPENDIX V

TABLES 34 AND 35

RECORDS IN WINTER OR ON MIGRATION OF OYSTERCATCHERS RINGED IN SOME BRITISH PASSAGE AND WINTERING AREAS (FIGURES 15–17)

The data tabulated here relate to Oystercatchers marked by the M.A.F.F. in its five study areas in Wales and western England, except for several recoveries of experimental birds which had earlier been transported from Morecambe Bay by E. J. M. Buxton and released some way from their place of capture. The very few local recoveries of Oystercatchers ringed by others in the Wash and elsewhere are omitted.

The present records refer primarily to birds retrapped or found dead out of the breeding season and away from breeding grounds, either in main wintering areas or elsewhere, when probably on coastal passage. Although some records in the latter category were from potential breeding areas, these occurred either during the non-breeding season or else under circumstances where breeding was not suspected; records of Oystercatchers recovered when breeding, or probably breeding, are listed in Appendix III. However, because of incomplete recovery information, it is always possible that some birds, especially those from Scottish coasts, considered here as having been on spring passage were, in fact, already on their breeding grounds—and vice versa. The small numbers which might be involved, however, cannot radically alter the overall pattern and interpretation of the recoveries data.

The recoveries and recaptures, which are grouped by age at ringing, comprise two main classes: A, those in the area of ringing (Table 34); B, those away from the area of ringing (Table 35). Class 'A' (or local) records are within 10, and often 5, miles of the place of ringing. For the more distant (Class 'B') records the direction and extent of displacement are given individually. The recovery site is quoted, wherever possible, as the topographical area (bay, estuary, etc.) in which it is situated, since this is more meaningful ecologically than reference to the nearest town or village.

Symbols relating to date and manner of recovery are those listed previously (Appendix III), but the following terms are introduced to describe the season of recovery:
autumn . . . . . August through November (exceptionally from mid-July)
winter . . . . . December and January
spring . . . . . February through April (exceptionally until early May)
The combined period, August through April, is that part of the Oystercatcher's annual cycle during which migrating or wintering birds were available for ringing; it thus constitutes one complete 'season of ringing'.

All recoveries and recaptures notified up to 31 March 1967 are listed.

Table 34 Recoveries and recaptures in the area of ringing

Recovery season	Ringing area	Ring number	Dates		MR
			Ringed	Recovered	
(1) RINGED AS ADULTS					
Autumn of season ringed	*Morecambe Bay*	AT96596	18 Sep 1963	16 Oct 1963	v
		AT96766	18 Sep 1963	28 Sep 1963	x
		SS01979	18 Sep 1963	28 Sep 1963	x
		SS35471	6 Oct 1964	21 Oct 1964	/?/
		SS35480	7 Oct 1964	16 Oct 1964	( )
		SS35499	7 Oct 1964	9 Oct 1964	+
		AT96782	16 Oct 1963	20 Nov 1963	+
		AT96855	20 Oct 1963	19 Nov 1963	+
	Dee Estuary	AT88656	17 Sep 1963	15 Nov 1963	v
		SS15533	22 Oct 1964	7 Nov 1964	x
		SS14385	15 Nov 1963	30 Nov 1963	x
	Conway Bay	SS10891	25 Aug 1964	21 Nov 1964	v
		SS10917	25 Aug 1964	21 Nov 1964	v
		SS10966	11 Sep 1964	21 Nov 1964	v
	Burry Inlet	AT96487	5 Sep 1963	2 Nov 1963	v
		AT96491	5 Sep 1963	2 Nov 1963	v
Winter of season ringed	*Dee Estuary*	AT88663	17 Sep 1963	7 Dec 1963	x
		AT88670	17 Sep 1963	12 Dec 1963	x
		SS15690	6 Nov 1964	*10 Jan 1965*	x
		SS14217	15 Nov 1963	*29 Dec 1963*	x
		SS14357	15 Nov 1963	13 Dec 1963	x
		AT96932	15 Nov 1963	15 Jan 1964	x
		AT96957	15 Nov 1963	13 Dec 1963	x
		AT74227	28 Nov 1962	28 Dec 1962	( )
		AT74333	9 Jan 1963	26 Jan 1963	x
		AT74336	10 Jan 1963	25 Jan 1963	x
	Morecambe Bay	SS01617	18 Sep 1963	1 Jan 1964	x
		SS01774	18 Sep 1963	1 Dec 1963	x
		SS01772	7 Oct 1963	31 Dec 1963	x
		AT96188	16 Oct 1963	3 Jan 1964	x
		AT96786	16 Oct 1963	*28 Dec 1963*	x
		AT96795	16 Oct 1963	18 Jan 1964	+
		AT96837	18 Oct 1963	*3 Jan 1964*	x
		AT96841	19 Oct 1963	23 Dec 1963	+
		AT96874	20 Oct 1963	19 Jan 1964	v
		AT96886	21 Oct 1963	15 Jan 1964	+
		3087965	24 Nov 1962	6 Dec 1962	x
		SS38581	1 Nov 1964	3 Dec 1964	v
		SS38621	5 Nov 1964	4 Dec 1964	v
		SS38767	3 Dec 1964	*25 Jan 1965*	x
		SS17205	16 Dec 1963	23 Dec 1963	x
	Burry Inlet	3019822	11 Nov 1962	28 Jan 1963	x
		AT96407	5 Sep 1963	*29 Dec 1963*	x
		AT96496	5 Sep 1963	28 Jan 1964	+
	Exe Estuary	AT91627	15 Oct 1962	13 Jan 1963	x
		AT91645	17 Oct 1962	27 Jan 1963	x
		AT91646	17 Oct 1962	27 Jan 1963	x
		AT91650	17 Oct 1962	27 Jan 1963	x
Spring of season ringed	*Dee Estuary*	AT74273	28 Dec 1962	20 Feb 1963	x
		AT74362	10 Jan 1963	9 Feb 1963	x
		AT74368	11 Jan 1963	26 Apr 1963	x
		AT88131	27 Jan 1963	9 Mar 1963	v
		AT88321	10 Feb 1963	13 Feb 1963	v
	Morecambe Bay	AT96530	18 Sep 1963	10 May 1964	x
		SS01520	18 Sep 1963	20 Mar 1964	v
		SS01576	18 Sep 1963	5 Feb 1964	+
		SS01769	18 Sep 1963	30 Mar 1964	x
		AT96770	7 Oct 1963	15 Feb 1964	+
		AT96779	7 Oct 1963	*24 Feb 1964*	x
		SS35485	7 Oct 1964	5 Mar 1965	+

Table 34—continued

Recovery season	Ringing area	Ring number	Dates		MR
			Ringed	Recovered	
		SS38535	9 Oct 1964	3 Mar 1965	+
		AT96862	20 Oct 1963	8 Feb 1964	v
		SS38602	5 Nov 1964	6 Mar 1965	x
		AT96085	29 Nov 1962	3 Mar 1963	x A
		SS38789	10 Dec 1964	*4 Feb 1965*	x
		SS17268	15 Feb 1964	20 Feb 1964	x
		SS17271	16 Feb 1964	*6 Mar 1964*	x
		SS17317	20 Mar 1964	5 Apr 1964	x
		SS17320	20 Mar 1964	9 Apr 1964	v
	Exe Estuary	AT96927	4 Nov 1963	9 Feb 1964	x
1st Autumn after ringing	*Morecambe Bay*	SS01790	18 Sep 1963	– Nov 1964	x
		SS01766	7 Oct 1963	5 Nov 1964	v
		AT96079	28 Nov 1962	– Nov 1963	x
		SS01308	27 Mar 1963	18 Sep 1963	v
	Dee Estuary	AT88666	17 Sep 1963	22 Oct 1964	v
		AT74191	27 Sep 1961	30 Nov 1962	v
		AT88844	17 Oct 1963	22 Nov 1964	x
		SS14148	15 Nov 1963	22 Oct 1964	v
		SS14364	15 Nov 1963	22 Oct 1964	v
		SS14457	15 Nov 1963	25 Oct 1964	v
		AT88060	11 Jan 1963	1 Nov 1963	v
		AT88031	11 Jan 1963	4 Sep 1963	+
		AT74366	11 Jan 1963	21 Oct 1963	x
		AT88119	27 Jan 1963	3 Oct 1963	v
		AT88165	27 Jan 1963	17 Sep 1963	v
		AT88150	28 Jan 1963	15 Nov 1963	v
		SS01014	28 Jan 1963	31 Aug 1963	x
		AT88293	10 Feb 1963	15 Nov 1963	v
		AT88300	10 Feb 1963	15 Nov 1963	v
		AT88499	24 Feb 1963	17 Sep 1963	v
		SS01226	9 Mar 1963	1 Nov 1963	v
		SS01258	9 Mar 1963	1 Nov 1963	v
	Burry Inlet	AT96370	5 Sep 1963	8 Sep 1964	+
		AT96462	5 Sep 1963	20 Nov 1964	v
		392797	11 Nov 1962	5 Sep 1963	v
		392881	11 Nov 1962	5 Sep 1963	v
		392898	11 Nov 1962	5 Sep 1963	v
		3087903	11 Nov 1962	5 Sep 1963	v
		3087930	11 Nov 1962	5 Sep 1963	v
		AT96002	11 Nov 1962	a. 5 Sep 1963	v
				b. 4 Nov 1963	x
		AT96304	11 Nov 1962	2 Nov 1963	v
	Conway Bay	SS01301	13 Mar 1963	21 Nov 1964	v
1st Winter after ringing	*Morecambe Bay*	SS38512	8 Oct 1964	31 Dec 1965	+
		AT96785	16 Oct 1963	3 Dec 1964	v
		AT96064	27 Nov 1962	6 Jan 1964	x
		AT96087	30 Nov 1962	*23 Jan 1964*	x
	Dee Estuary	AT74223	15 Sep 1962	17 Jan 1964	v
		AT70330	27 Sep 1961	11 Jan 1963	v
		AT70340	27 Sep 1961	26 Jan 1963	x
		SS14377	15 Nov 1963	17 Jan 1965	x
		AT74319	28 Dec 1962	*13 Jan 1964*	x
		AT74391	11 Jan 1963	26 Jan 1964	x
		AT74486	11 Jan 1963	17 Jan 1964	v
		SS01015	28 Jan 1963	26 Jan 1964	x
		AT88253	7 Feb 1963	26 Dec 1963	x
	Conway Bay	SS38651	21 Nov 1964	30 Jan 1966	x
	Burry Inlet	AT96005	11 Nov 1962	8 Jan 1964	+
1st Spring after ringing	*Morecambe Bay*	SS01991	18 Sep 1963	7 Feb 1965	x
		AT96783	16 Oct 1963	3 Mar 1965	+
		SS17290	15 Mar 1964	22 Mar 1965	x

Table 34—continued

Recovery season	Ringing area	Ring number	Dates		MR
			Ringed	Recovered	
		SS17326	21 Mar 1964	3 Mar 1965	+
		SS38623	5 Nov 1964	4 Mar 1966	+
	Burry Inlet	SS01376	5 Sep 1963	*4 Apr 1965*	/?/
		AT96001	11 Nov 1962	*13 Feb 1964*	/?/
	Dee Estuary	AT74115	27 Sep 1961	2 Mar 1963	x
		AT74163	27 Sep 1961	13 Mar 1963	x
		AT74175	27 Sep 1961	10 Feb 1963	v
		AT88407	10 Feb 1963	2 Feb 1964	x
		SS15706	6 Nov 1964	3 Apr 1966	x
2nd Autumn after ringing	*Dee Estuary*	AT88764	17 Sep 1963	24 Oct 1965	x
		AT74110	27 Sep 1961	1 Nov 1963	v
		AT74295	28 Dec 1962	22 Oct 1964	v
		AT74358	10 Jan 1963	1 Nov 1964	x
		AT88068	11 Jan 1963	6 Nov 1964	v
		AT88099	27 Jan 1963	22 Oct 1964	v
		AT88159	28 Jan 1963	22 Oct 1964	v
		AT88477	13 Feb 1963	6 Nov 1964	v
		SS01182	9 Mar 1963	22 Oct 1964	v
		AT88435	12 Mar 1963	*6 Sep 1964*	+
	Burry Inlet	SS01338	5 Sep 1963	5 Oct 1965	+
		392816	11 Nov 1962	8 Sep 1964	+
	Morecambe Bay	AT96061	27 Nov 1962	6 Oct 1964	v
		SS10980	4 Oct 1964	28 Nov 1966	+
		SS38549	9 Oct 1964	28 Nov 1966	+
		SS38590	2 Nov 1964	28 Nov 1966	+
		SS38523	9 Oct 1964	19 Nov 1966	x A
	Conway Bay	SS10868	25 Aug 1964	28 Sep 1966	x
		SS38577	21 Oct 1964	20 Sep 1966	v
		SS10856	25 Aug 1964	21 Sep 1966	v
		SS10911	25 Aug 1964	21 Sep 1966	v
		SS10864	25 Aug 1964	21 Sep 1966	v
		SS10882	25 Aug 1964	21 Sep 1966	v
		SS10888	25 Aug 1964	21 Sep 1966	v
		SS10914	25 Aug 1964	21 Sep 1966	v
		SS10862	25 Aug 1964	21 Sep 1966	v
		SS17498	25 Aug 1964	21 Sep 1966	v
		SS17494	13 Aug 1964	21 Sep 1966	v
		SS10976	15 Sep 1964	21 Sep 1966	v
		SS38718	21 Nov 1964	21 Sep 1966	v
		SS38664	21 Nov 1964	21 Sep 1966	v
		SS38668	21 Nov 1964	21 Sep 1966	v
		SS38672	21 Nov 1964	21 Sep 1966	v
		SS38702	21 Nov 1964	21 Sep 1966	v
2nd Winter after ringing	*Morecambe Bay*	SS01947	18 Sep 1963	*10 Dec 1965*	+
		SS01901	7 Oct 1963	*3 Jan 1966*	x
		AT96784	16 Oct 1963	30 Jan 1966	+
		SS17288	13 Mar 1964	19 Jan 1966	+
		SS38519	8 Oct 1964	26 Jan 1967	+
	Dee Estuary	AT74171	27 Sep 1961	7 Dec 1963	x
		AT96964	15 Nov 1963	21 Jan 1966	v
		AT88023	11 Jan 1963	c. 17 Jan 1965	x
2nd Spring after ringing	*Dee Estuary*	AT74109	27 Sep 1961	c. 6 Mar 1964	x
		AT74297	28 Dec 1962	14 Mar 1965	x
		SS14646	22 Oct 1964	8 Feb 1967	x
		SS15707	6 Nov 1964	*14 Feb 1967*	x A
	Morecambe Bay	AT96999	16 Dec 1963	*1 May 1966*	x
3rd Autumn after ringing	*Morecambe Bay*	AT96128	15 Feb 1963	22 Aug 1965	x
		AT96825	16 Oct 1963	30 Oct 1966	+
	Dee Estuary	AT74132	27 Sep 1961	6 Nov 1964	v
		AT74213	27 Sep 1961	6 Nov 1964	v

Table 34—continued

Recovery season	Ringing area	Ring number	Dates		MR
			Ringed	Recovered	
		AT88406	10 Feb 1963	4 Sep 1965	x
		AT88425	13 Feb 1963	25 Sep 1965	v
		SS01203	9 Mar 1963	20 Nov 1965	v
	Burry Inlet	SS01393	5 Sep 1963	13 Oct 1966	v
		SS01433	5 Sep 1963	17 Aug 1966	v
		SS01402	5 Sep 1963	17 Aug 1966	v
		AT78346	2 Nov 1963	17 Aug 1966	v
3rd Winter after ringing	*Dee Estuary*	AT74338	10 Jan 1963	3 Dec 1965	x
		AT88288	10 Feb 1963	26 Jan 1966	/?/
3rd Spring after ringing	*Dee Estuary*	SS01221	9 Mar 1963	*7 Feb 1966*	x
		AT88335	10 Feb 1963	*27 Feb 1966*	x
		SS01090	28 Jan 1963	*7 Mar 1966*	x
	Morecambe Bay	SS01619	18 Sep 1963	19 Feb 1967	x
		AT96984	14 Dec 1963	27 Mar 1967	x
(2) Ringed as 1st Year Immatures					
Winter of season ringed	*Dee Estuary*	SS14362	15 Nov 1963	1 Jan 1964	+
		AT74238	30 Nov 1962	1 Jan 1963	x
		AT74313	28 Dec 1962	11 Jan 1963	v
	Morecambe Bay	SS01800	7 Oct 1963	8 Jan 1964	+
		AT96194	16 Oct 1963	14 Dec 1963	v
		AT96058	26 Nov 1962	6 Dec 1962	+
	Exe Estuary	AT96934	5 Nov 1963	24 Dec 1963	x
Spring of season ringed	*Dee Estuary*	SS14823	22 Oct 1964	*10 Feb 1965*	x
		AT74339	10 Jan 1963	30 Mar 1963	x
		AT74393	11 Jan 1963	22 Feb 1963	x
		AT88349	10 Feb 1963	29 Mar 1963	x
		AT88429	13 Feb 1963	22 Mar 1963	x
		SS01048	28 Jan 1963	9 Mar 1963	v
	Morecambe Bay	AT96891	21 Oct 1963	13 Mar 1964	x
		AT96978	13 Dec 1963	12 Feb 1964	x
		AT96125	14 Feb 1963	3 Mar 1963	x
	Burry Inlet	AT96405	5 Sep 1963	27 Mar 1964	x
1st Summer after ringing	*Dee Estuary*	AT74431	28 Dec 1962	26 Jun 1963	v
		AT74337	10 Jan 1963	26 Jun 1963	v
		AT88195	28 Jan 1963	26 Jun 1963	v
		SS01079	28 Jan 1963	26 Jun 1963	v
		SS01098	28 Jan 1963	26 Jun 1963	v
		SS01216	9 Mar 1963	26 Jun 1963	v
		SS01225	9 Mar 1963	26 Jun 1963	v
		SS01242	9 Mar 1963	26 Jun 1963	v
1st Autumn after ringing	*Morecambe Bay*	AT96192	16 Oct 1963	22 Oct 1964	+
	Dee Estuary	AT88676	17 Sep 1963	22 Oct 1964	v
		AT88713	17 Sep 1963	c. 20 Jul 1964	x
		SS01079	28 Jan 1963	15 Nov 1963	v
		AT88445	13 Feb 1963	15 Nov 1963	v
		SS01197	9 Mar 1963	15 Nov 1963	v
		SS01237	9 Mar 1963	15 Nov 1963	v
1st Winter after ringing	*Dee Estuary*	AT88324	10 Feb 1963	17 Jan 1964	v
		AT88396	10 Feb 1963	17 Jan 1964	v
		SS01205	9 Mar 1963	1 Dec 1963	x
1st Spring after ringing	*Morecambe Bay*	AT96875	20 Oct 1963	5 Apr 1965	x
		SS17354	10 Apr 1964	8 Mar 1965	+
	Dee Estuary	AT88689	17 Sep 1963	22 Apr 1965	x

Table 34—continued

Recovery season	Ringing area	Ring number	Dates		MR
			Ringed	Recovered	
2nd Autumn after ringing	*Dee Estuary*	SS01098	28 Jan 1963	6 Nov 1964	v
	Conway Bay	SS01278	13 Mar 1963	14 Aug 1964	v
2nd Spring after ringing	*Dee Estuary*	SS01070	28 Jan 1963	7 Mar 1965	x
		SS01114	28 Jan 1963	3 Apr 1965	v
4th Autumn after ringing	*Burry Inlet*	392820	11 Nov 1962	17 Aug 1966	v
(3) Ringed as Older than 1st Year Immatures					
Autumn of season ringed	*Morecambe Bay*	SS10978	4 Oct 1964	8 Oct 1964	v
	Dee Estuary	AT88962	1 Nov 1963	15 Nov 1963	v
		SS14206	15 Nov 1963	19 Nov 1963	+
Winter of season ringed	*Morecambe Bay*	AT96195	16 Oct 1963	20 Jan 1964	+
		3087975	24 Nov 1962	1 Dec 1962	x
		AT96072	28 Nov 1962	1 Dec 1962	x
		SS17203	16 Dec 1963	c. 25 Dec 1963	x
	Dee Estuary	SS14165	15 Nov 1963	4 Jan 1964	x
Spring of season ringed	*Morecambe Bay*	SS01860	18 Sep 1963	16 Mar 1964	x
		SS01917	18 Sep 1963	25 Feb 1964	x
		392737	29 Sep 1962	2 Mar 1963	x
		AT96853	19 Oct 1963	2 Feb 1964	x A
		AT96985	14 Dec 1963	– Feb 1964	x
		AT96987	14 Dec 1963	3 Feb 1964	x
	Dee Estuary	SS14732	22 Oct 1964	*30 Apr 1965*	+
		SS14259	15 Nov 1963	31 May 1964	x
		AT74280	28 Dec 1962	10 Feb 1963	v
		AT74410	28 Dec 1962	13 Feb 1963	v
		AT74461	11 Jan 1963	10 Feb 1963	v
		AT88339	10 Feb 1963	17 Apr 1963	x
		SS01164	28 Jan 1963	9 Mar 1963	v
1st Summer after ringing	*Dee Estuary*	AT74260	30 Nov 1962	26 Jun 1963	v
1st Autumn after ringing	*Morecambe Bay*	SS17308	20 Mar 1964	6 Oct 1964	v
	Dee Estuary	AT88685	17 Sep 1963	22 Oct 1964	v
		SS14523	1 Nov 1963	6 Nov 1964	v
		AT88850	1 Nov 1963	23 Sep 1964	/?/
		SS14281	15 Nov 1963	22 Oct 1964	v
		AT74496	11 Jan 1963	17 Sep 1963	v
		AT88213	28 Jan 1963	15 Nov 1963	v
		SS14581	17 Jan 1964	22 Oct 1964	v
		AT88354	10 Feb 1963	3 Nov 1963	( )
	Burry Inlet	392787	11 Nov 1962	5 Sep 1963	v
		392836	11 Nov 1962	5 Sep 1963	v
		392857	11 Nov 1962	5 Sep 1963	v
		392871	11 Nov 1962	5 Sep 1963	v
		392897	11 Nov 1962	5 Sep 1963	v
		AT96271	11 Nov 1962	5 Sep 1963	v
		AT96343	11 Nov 1962	5 Sep 1963	v
		AT96344	11 Nov 1962	5 Sep 1963	v
1st Winter after ringing	*Morecambe Bay*	AT96156	31 Mar 1963	8 Dec 1964	+
	Dee Estuary	AT88264	7 Feb 1963	11 Jan 1964	x
		AT88311	10 Feb 1963	17 Jan 1964	v
1st Spring after ringing	*Morecambe Bay*	SS01731	18 Sep 1963	16 Mar 1965	+
		AT96114	11 Feb 1963	15 Feb 1964	x
		SS17298	20 Mar 1964	16 Mar 1965	+
	Dee Estuary	SS14423	15 Nov 1963	12 Apr 1965	x
		AT74410	28 Dec 1962	*19 Feb 1964*	x
		AT74392	11 Jan 1963	*20 Apr 1964*	x

Table 34—continued

Recovery season	Ringing area	Ring number	Dates		MR
			Ringed	Recovered	
	Burry Inlet	AT96454	5 Sep 1963	18 Feb 1965	+
2nd Autumn after ringing	*Dee Estuary*	3019700	17 Oct 1963	25 Sep 1965	v
	Conway Bay	SS01285	13 Mar 1963	25 Aug 1964	v
		SS17496	14 Aug 1964	20 Sep 1966	v
		SS10974	11 Sep 1964	21 Sep 1966	v
		SS38710	21 Nov 1964	21 Sep 1966	v
		SS38696	21 Nov 1964	21 Sep 1966	v
2nd Winter after ringing	*Morecambe Bay*	SS17313	20 Mar 1964	16 Dec 1965	+
	Dee Estuary	AT88969	1 Nov 1963	23 Dec 1965	v
2nd Spring after ringing	*Dee Estuary*	AT74449	28 Dec 1962	25 Apr 1965	x
		AT74450	28 Dec 1962	7 Mar 1965	x
		AT88298	10 Feb 1963	3 Apr 1965	v
	Morecambe Bay	AT96790	16 Oct 1963	13 Mar 1966	+
	Conway Bay	SS17491	13 Aug 1964	1 Mar 1966	x
3rd Autumn after ringing	*Dee Estuary*	AT88823	1 Nov 1963	16 Sep 1966	v
		AT88948	1 Nov 1963	16 Aug 1966	v
		AT88992	1 Nov 1963	6 Sep 1966	x A
		AT88773	17 Sep 1963	17 Jul 1966	v
3rd Winter after ringing	*Morecambe Bay*	AT96077	28 Nov 1962	26 Dec 1965	x A
	Dee Estuary	AT74388	11 Jan 1963	4 Dec 1965	x
4th Autumn after ringing	*Morecambe Bay*	AT96098	2 Dec 1962	25 Nov 1966	+
	Burry Inlet	392831	11 Nov 1962	17 Aug 1966	v
		3087955	11 Nov 1962	17 Aug 1966	v
		AT96311	11 Nov 1962	17 Aug 1966	v
4th Spring after ringing	*Dee Estuary*	AT74415	28 Dec 1962	26 Feb 1967	x
The following six recoveries are of birds ringed as summering immatures and are not shown in Figure 17:					
	Dee Estuary	AT88593	26 Jun 1963	25 Sep 1963	( )
		AT88622	26 Jun 1963	1 Nov 1963	v
		AT88516	26 Jun 1963	15 Nov 1963	v
		AT88527	26 Jun 1963	8 May 1964	x
		AT88514	26 Jun 1963	22 Oct 1964	v
		AT88606	26 Jun 1963	22 Oct 1964	v

N.B. 392491 ringed in Dee Estuary on 2 Nov 1956 was retrapped there on 9 Mar 1963, in the 6th spring after ringing.

The following six experimental birds were caught in Morecambe Bay and transported to other areas before release by E. J. M. Buxton:

Ring number	Place of release	Dates		Place of recovery	MR
		Released	Recovered		
YD0212	Severn Estuary, Glos.	24 Feb 1957	2 Jan 1958	Morecambe Bay	x
YD0216	Severn Estuary, Glos.	24 Feb 1957	*29 Jan 1958*	Morecambe Bay	+
YD0217	Severn Estuary, Glos.	24 Feb 1957	*1 Feb 1961*	Morecambe Bay	x
YD0240	Severn Estuary, Glos.	26 Feb 1957	26 Nov 1961	Dee Estuary	x
YD0233	Budle Bay, Northumberland	25 Feb 1957	21 Dec 1965	Morecambe Bay	+
YD0237	Budle Bay, Northumberland	25 Feb 1957	22 Jun 1957	Amble, Northumberland	x

Table 35 Recoveries and recaptures away from area of ringing

Ringing area	Ring number	Dates		Recovery season and area		Movement *miles and direction*	MR
		Ringed	Recovered				
(1) RINGED AS ADULTS				Autumn of season ringed			
Morecambe Bay	SS01859	18 Sep 1963	1 Nov 1963	Flintshire	Dee Estuary	50 S	v
				Winter of season ringed			
Morecambe Bay	SS01677	18 Sep 1963	17 Dec 1963	Orkney	Sanday	365 N	( )
	AT96549	18 Sep 1963	5 Jan 1964	Cumberland	Coulderton	33 NNW	x A
	AT96591	18 Sep 1963	1 Jan 1964	Lancashire	Formby Point	35 S	x
Dee Estuary	AT88787	3 Oct 1963	30 Jan 1964	Merioneth	Mawddach Estuary	56 SW	x
	SS14791	22 Oct 1964	12 Jan 1965	Lancashire	Morecambe Bay	50 NNE	+
	AT88861	1 Nov 1963	29 Dec 1963	Lancashire	Morecambe Bay	58 NNE	x
	SS15681	6 Nov 1964	8 Jan 1965	Isle of Arran	Firth of Clyde	170 NW	x A
	SS14439	15 Nov 1963	26 Dec 1963	Lancashire	Blackpool	34 NNE	x
	SS14345	15 Nov 1963	27 Dec 1963	Lancashire	Morecambe Bay	53 NNE	x
	SS14329	15 Nov 1963	*29 Dec 1963*	Lancashire	Morecambe Bay	42 NNE	x
	SS14443	15 Nov 1963	29 Dec 1963	Caernarvonshire	Foryd Bay	43 WSW	x
	SS14500	15 Nov 1963	28 Dec 1963	Caernarvonshire	Conway Estuary	20 W	x
	SS14431	15 Nov 1963	*5 Jan 1964*	Caernarvonshire	Conway Bay	32 W	+
	SS14352	15 Nov 1963	12 Jan 1964	Somerset	Weston-super-Mare	135 S	x
	AT74401	28 Dec 1962	2 Jan 1963	Anglesey	Moelfre	40 W	x
Burry Inlet	SS01357	5 Sep 1963	30 Dec 1963	Glamorgan	Cardiff	50 E	x
				Spring of season ringed			
Morecambe Bay	SS35476	6 Oct 1964	7 Feb 1965	Lancashire	Blackpool	19 S	x
	SS38584	2 Nov 1964	*12 Feb 1965*	Anglesey	Holyhead	90 SW	x
	SS38609	5 Nov 1964	*6 Mar 1965*	Co. Wexford	Wexford Harbour	190 SW	+
	SS01905	18 Sep 1963	4 Mar 1964	Wigtownshire	Milleur Point	100 NW	x
	SS38533	9 Oct 1964	7 Mar 1965	Fife	Firth of Forth	140 N	x
	AT96137	15 Feb 1963	10 Mar 1963	Cumberland	Whitehaven	30 NW	x
Dee Estuary	AT88650	17 Sep 1963	18 Feb 1964	Lancashire	Morecambe Bay	50 NNE	+
	AT88693	17 Sep 1963	c. 5 Feb 1964	Dumfriesshire	Solway Firth	110 N	x
	SS15539	22 Oct 1964	10 Feb 1965	Lancashire	Morecambe Bay	50 NNE	+
	SS14127	15 Nov 1963	2 Feb 1964	Devon	Exe Estuary	185 S	x
	SS14255	15 Nov 1963	11 Mar 1964	Lancashire	Morecambe Bay	50 NNE	+
	AT74352	10 Jan 1963	*3 May 1963*	Caernarvonshire	Morfa Nevin	60 WSW	x
Burry Inlet	AT78337	2 Nov 1963	28 Feb 1964	Co. Down	Belfast Lough	220 NNW	+
				1st Autumn after ringing			
Morecambe Bay	AT96610	18 Sep 1963	21 Nov 1964	Caernarvonshire	Conway Bay	70 SW	v
	SS17274	16 Feb 1964	22 Oct 1964	Flintshire	Dee Estuary	57 SSW	v
Conway Bay	SS38709	21 Nov 1964	14 Aug 1965	Fife	Firth of Forth	200 NNE	+
Burry Inlet	SS01332	5 Sep 1963	*28 Aug 1964*	Anglesey	Valley	115 N	x
Dee Estuary	AT88070	11 Jan 1963	25 Aug 1963	Lancashire	Ribble Estuary	20 N	x
	AT88131	27 Jan 1963	9 Sep 1963	Lancashire	Morecambe Bay	53 NNE	x
	AT88450	13 Feb 1963	7 Sep 1963	Lancashire	Morecambe Bay	48 N	x A
	AT88446	13 Feb 1963	18 Sep 1963	Lancashire	Morecambe Bay	45 N	v
	AT88492	24 Feb 1963	19 Sep 1963	Lancashire	Morecambe Bay	53 N	+
	SS01054	28 Jan 1963	18 Sep 1963	Lancashire	Morecambe Bay	45 N	v
	SS14125	15 Nov 1963	7 Oct 1964	Lancashire	Morecambe Bay	53 N	v
Exe Estuary	AT91635	16 Oct 1962	c. 25 Nov 1963	Devon	Ladram Bay	10 ENE	x
				1st Winter after ringing			
Morecambe Bay	AT96153	30 Mar 1963	31 Jan 1964	Angus	Arbroath	170 N	x
Dee Estuary	SS14917	22 Oct 1964	9 Dec 1965	Lancashire	Morecambe Bay	50 NNE	+
	SS14677	22 Oct 1964	21 Dec 1965	Lancashire	Morecambe Bay	50 NNE	+
	AT74265	28 Dec 1962	25 Dec 1963	Lancashire	Morecambe Bay	50 N	x
	AT88014	11 Jan 1963	c. 29 Dec 1963	Lancashire	Morecambe Bay	36 N	x
	AT88452	13 Feb 1963	27 Dec 1963	Cumberland	Allonby	95 N	x
	AT74241	30 Nov 1962	– Dec 1963	Anglesey	Red Wharf Bay	37 W	x
	AT74465	11 Jan 1963	27 Dec 1963	Co. Wicklow	Greystones	115 W	x
	AT74330	28 Dec 1962	22 Dec 1963	Merioneth	Dovey Estuary	67 SSW	x
	AT74139	27 Sep 1961	8 Jan 1963	Denbighshire	Colwyn Bay	16 W	x
	AT88040	11 Jan 1963	*9 Jan 1964*	Caernarvonshire	Conway Bay	33 W	x
	AT74437	28 Dec 1962	13 Jan 1964	Carmarthenshire	Burry Inlet	125 S	+
	AT88009	11 Jan 1963	12 Jan 1964	Lancashire	Altcar	13 NNE	x
	AT74312	28 Dec 1962	8 Jan 1964	Lancashire	Morecambe Bay	50 N	x A
	SS01035	28 Jan 1963	12 Jan 1964	Durham	Whitburn	135 NNE	x

Table 35—continued

Ringing area	Ring number	Dates		Recovery season and area		Movement *miles and direction*	MR
		Ringed	Recovered				
Burry Inlet	AT96314	11 Nov 1962	5 Jan 1964	Lancashire	Morecambe Bay	165 NNE	x
				1st Spring after ringing			
Morecambe Bay	SS17219	18 Jan 1964	7 Mar 1965	Cumberland	Solway Firth	55 N	x
	SS01815	18 Sep 1963	8 Apr 1965	Fife	Firth of Forth	140 N	x
	SS38613	5 Nov 1964	c. 1 Mar 1966	Denbighshire	Abergele	60 SSW	x
Dee Estuary	AT88039	11 Jan 1963	6 Feb 1964	Caernarvonshire	Llandudno	26 W	x
	AT74323	28 Dec 1962	5 Feb 1964	Lancashire	Morecambe Bay	47 N	+
	AT88469	13 Feb 1963	8 Feb 1964	Lancashire	Morecambe Bay	53 N	v
	AT88419	13 Feb 1963	12 Feb 1964	Lancashire	Morecambe Bay	53 N	v
	AT88280	7 Feb 1963	13 Feb 1964	Kirkcudbrightshire	Solway Firth	102 N	x
	AT88811	17 Oct 1963	22 Feb 1965	Lancashire	Morecambe Bay	50 N	x
	AT74324	28 Dec 1962	16 Mar 1964	Lancashire	Morecambe Bay	47 N	x A
	AT88416	13 Feb 1963	16 Apr 1964	Lancashire	Morecambe Bay	55 N	x
	AT74283	28 Dec 1962	16 May 1964	Denbighshire	Colwyn Bay	22 W	x
				2nd Autumn after ringing			
Morecambe Bay	SS10989	4 Oct 1964	11 Sep 1966	Shetland	Sumburgh	400 N	v
Dee Estuary	SS14117	15 Nov 1963	25 Jul 1965	Anglesey	Beddmanarch Bay	48 W	x
	AT74305	28 Dec 1962	8 Oct 1964	Lancashire	Morecambe Bay	55 N	v
	AT88826	1 Nov 1963	3 Nov 1965	Fife	Kemback	205 N	+
	SS14793	22 Oct 1964	17 Aug 1966	Glamorgan	Burry Inlet	125 SSW	v
	SS15606	22 Oct 1964	17 Aug 1966	Glamorgan	Burry Inlet	125 SSW	v
Conway Bay	SS01299	13 Mar 1963	22 Oct 1964	Flintshire	Dee Estuary	27 E	v
				2nd Winter after ringing			
Dee Estuary	AT88272	7 Feb 1963	10 Dec 1964	Lancashire	Morecambe Bay	45 N	v
	AT88348	10 Feb 1963	6 Jan 1965	Caernarvonshire	Conway Bay	32 W	x
	AT88304	10 Feb 1963	21 Jan 1965	Dumfriesshire	Solway Firth	110 N	x
	SS14637	22 Oct 1964	16 Jan 1967	FRANCE, Manche	Agon	300 SSE	+
				2nd Spring after ringing			
Morecambe Bay	SS38630	5 Nov 1964	*28 Mar 1967*	Cheshire	Dee Estuary	60 S	x
Dee Estuary	AT74150	27 Sep 1961	15 Feb 1964	Lancashire	Morecambe Bay	57 NNE	v
	AT74389	11 Jan 1963	26 Feb 1965	Caernarvonshire	Llandudno	27 W	x
	AT74406	28 Dec 1962	*25 Mar 1965*	Anglesey	Cemaes Bay	50 W	x
	AT74370	11 Jan 1963	18 Apr 1965	Denbighshire	Abergele	15 WSW	x A
	SS14312	15 Nov 1963	10 Mar 1966	Lancashire	Morecambe Bay	42 NNE	x
	SS14162	15 Nov 1963	13 Mar 1966	Lancashire	Morecambe Bay	57 NNE	+
	AT88681	17 Sep 1963	4 Mar 1966	Between Glamorgan and Cheshire	Margam Crewe	?	x
				impacted on train			
Conway Bay	SS38661	21 Nov 1964	12 Mar 1967	Anglesey	Lligwy Bay	13 NW	x
				3rd Autumn after ringing			
Morecambe Bay	SS01537	18 Sep 1963	29 Aug 1966	Westmorland	Kirkstone Pass (at 2 000 ft)	32 NNE	x
Dee Estuary	AT88360	10 Feb 1963	c. 1 Sep 1965	Lancashire	Morecambe Bay	50 N	/?/
	AT88977	1 Nov 1963	15 Nov 1966	Lancashire	Morecambe Bay	50 NNE	+
				3rd Winter after ringing			
Dee Estuary	SS01009	28 Jan 1963	17 Jan 1966	Lancashire	Morecambe Bay	50 NNE	+
	SS14548	17 Jan 1964	*16 Jan 1967*	Lancashire	Morecambe Bay	38 N	x
				3rd Spring after ringing			
Morecambe Bay	SS17277	16 Feb 1964	15 Feb 1967	Cheshire	Dee Estuary	48 S	x
	SS17201	16 Dec 1963	18 Mar 1967	Fife	Forth Estuary	135 N	x
Dee Estuary	AT74136	27 Sep 1961	14 Feb 1965	Lancashire	Duddon Estuary	55 N	x
	AT88099	27 Jan 1963	18 Mar 1966	Caernarvonshire	Foryd Bay	45 WSW	x
	SS01209	9 Mar 1963	10 Mar 1966	Denbighshire	Colwyn Bay	15 W	/?/
	SS14236	15 Nov 1963	24 Feb 1967	Lancashire	Morecambe Bay	50 NNE	+
				4th Autumn after ringing			
Burry Inlet	AT96329	11 Nov 1962	10 Aug 1966	FRANCE, Calvados	Ouistreham	230 SE	+
Dee Estuary	AT88110	27 Jan 1963	25 Nov 1966	Lancashire	Morecambe Bay	50 NNE	+
	AT88440	13 Feb 1963	23 Oct 1966	Lancashire	Duddon Estuary	50 N	x
	SS01217	9 Mar 1963	17 Aug 1966	Glamorgan	Burry Inlet	125 SSW	v
	AT88279	7 Feb 1963	21 Sep 1966	Caernarvonshire	Conway Bay	35 W	v

Table 35—continued

Ringing area	Ring number	Dates Ringed	Dates Recovered	Recovery season and area		Movement *miles and direction*	MR
				4th Spring after ringing			
Dee Estuary	AT74111	27 Sep 1961	23 Mar 1966	Lancashire	Morecambe Bay	50 NNE	+
	AT74175	27 Sep 1961	8 Apr 1966	Lancashire	Morecambe Bay	50 N	x A
	AT74341	10 Jan 1963	22 Feb 1967	Lancashire	Morecambe Bay	50 NNE	+
(2) RINGED AS 1ST YEAR IMMATURES				Winter of season ringed			
Dee Estuary	AT88706	17 Sep 1963	5 Jan 1964	Monmouthshire	Usk Estuary	127 S	+
	SS14472	15 Nov 1963	c. 25 Dec 1963	Denbighshire	Colwyn Bay	16 W	x
				1st Autumn after ringing			
Dee Estuary	SS14563	17 Jan 1964	20 Jul 1964	Lancashire	Morecambe Bay	45 N	x
				1st Winter after ringing			
Dee Estuary	SS01136	28 Jan 1963	c. 23 Dec 1963	Anglesey	Llanddwyn Is.	37 WSW	x
	SS01001	28 Jan 1963	5 Jan 1964	Lancashire	Morecambe Bay	45 NNE	+
				2nd Autumn after ringing			
Dee Estuary	AT88758	17 Sep 1963	24 Aug 1965	FRANCE	Ille et Vilaine	340 SSE	+
	SS01053	28 Jan 1963	8 Oct 1964	Lancashire	Morecambe Bay	58 NNE	v
				2nd Spring after ringing			
Dee Estuary	SS01200	9 Mar 1963	12 Feb 1965	Lancashire	Morecambe Bay	50 NNE	+
				3rd Autumn after ringing			
Dee Estuary	SS01173	9 Mar 1963	*4 Jul 1965*	Lancashire	Morecambe Bay	62 NNE	x A
				3rd Winter after ringing			
Dee Estuary	SS01264	9 Mar 1963	26 Jan 1966	Kirkcudbrightshire	Rough Firth	105 N	x
(3) RINGED AS OLDER THAN 1ST YEAR IMMATURES				Autumn of season ringed			
Conway Bay	SS17495	14 Aug 1964	22 Oct 1964	Flintshire	Dee Estuary	27 E	v
				Winter of season ringed			
Morecambe Bay	SS01501	18 Sep 1963	*22 Jan 1964*	Cheshire	Birkenhead	45 S	x
Dee Estuary	AT88751	17 Sep 1963	30 Dec 1963	Lancashire	Morecambe Bay	37 N	x
	AT88996	1 Nov 1963	5 Jan 1964	Lancashire	Morecambe Bay	58 NNE	x
	AT88911	1 Nov 1963	18 Jan 1964	Merioneth	Dovey Estuary	60 SSW	+
Burry Inlet	SS01463	5 Sep 1963	*3 Jan 1964*	Monmouthshire	Severn Estuary	62 E	x
				Spring of season ringed			
Dee Estuary	SS14309	15 Nov 1963	*2 Feb 1964*	Denbighshire	Llandulas	12 W	x
	AT88929	1 Nov 1963	17 Feb 1964	Lancashire	Morecambe Bay	50 NNE	+
	SS14635	22 Oct 1964	23 Apr 1965	Sutherland	Off Strathy Point	370 N	( )
	AT88032	11 Jan 1963	15 May 1963	Caernarvonshire	Conway Bay	34 W	+
Burry Inlet	AT96354	5 Sep 1963	*25 May 1964*	Pembrokeshire	Saundersfoot Bay	18 W	x
				1st Autumn after ringing			
Morecambe Bay	SS35452	6 Oct 1964	22 Oct 1965	Flintshire	Dee Estuary	55 S	v
Dee Estuary	AT88138	28 Jan 1963	3 Sep 1963	Cardiganshire	Aberystwyth	72 SSW	x
	SS14524	1 Nov 1963	7 Oct 1964	Lancashire	Morecambe Bay	55 N	v
Burry Inlet	SS01493	5 Sep 1963	– Aug 1964	East Lothian	Firth of Forth	310 N	x
	AT78350	2 Nov 1963	22 Oct 1964	Flintshire	Dee Estuary	125 NNE	v
				1st Winter after ringing			
Dee Estuary	AT88375	10 Feb 1963	1 Jan 1964	Lancashire	Blackpool	32 N	x
	AT88166	28 Jan 1963	5 Jan 1964	Lancashire	Morecambe Bay	60 N	x
				1st Spring after ringing			
Dee Estuary	AT96970	15 Nov 1963	5 Feb 1965	Co. Cork	Cork Harbour	230 WSW	x
	AT88292	10 Feb 1963	15 Feb 1964	Lancashire	Morecambe Bay	47 NNE	x A
Burry Inlet	AT96340	11 Nov 1962	15 Mar 1964	Cumberland	Seascale	190 N	x
				2nd Autumn after ringing			
Dee Estuary	SS01188	9 Mar 1963	7 Oct 1964	Lancashire	Morecambe Bay	58 NNE	v
	SS14925	22 Oct 1964	17 Aug 1966	Glamorgan	Burry Inlet	125 SSW	v
	SS14719	22 Oct 1964	12 Nov 1966	Glamorgan	Burry Inlet	125 SSW	v
Burry Inlet	AT78350	2 Nov 1963	15 Aug 1965	Dumfriesshire	Solway Firth	235 N	x
	392787	11 Nov 1962	*16 Aug 1964*	Dumfriesshire	Solway Firth	235 N	x
	392877	11 Nov 1962	10 Sep 1964	Anglesey	Red Wharf Bay	115 N	x

Table 35—continued

Ringing area	Ring number	Dates		Recovery season and area		Movement *miles and direction*	MR
		Ringed	Recovered				
Exe Estuary	AT91638	16 Oct 1962	7 Oct 1964	Somerset	Severn Estuary	70 NNE	x
				2nd Winter after ringing			
Dee Estuary	AT88792	17 Oct 1963	27 Dec 1965	Lancashire	Morecambe Bay	50 NNE	x
	SS144–2	15 Nov 1963	15 Jan 1966	Cardiganshire	New Quay	90 SSW	x
				2nd Spring after ringing			
Dee Estuary	SS01003	28 Jan 1963	*26 Feb 1965*	Ayrshire	Troon	160 N	x
	AT88012	11 Jan 1963	28 Feb 1965	Lancashire	Morecambe Bay	40 N	x
Morecambe Bay	SS01936	18 Sep 1963	*5 Mar 1966*	Kirkcudbrightshire	Solway Firth	60 N	x
				3rd Autumn after ringing			
Dee Estuary	AT74461	11 Jan 1963	c. 25 Sep 1965	Lancashire	Morecambe Bay	50 N	x
				3rd Winter after ringing			
Dee Estuary	AT88170	28 Jan 1963	21 Dec 1965	Lancashire	Morecambe Bay	50 NNE	+
				3rd Spring after ringing			
Dee Estuary	AT88116	27 Jan 1963	10 Mar 1966	Lancashire	Morecambe Bay	50 NNE	+
The following six recoveries are of birds caught and ringed as summering immatures and are not shown in Figure 17:							
Dee Estuary	AT88520	26 Jun 1963	*11 Jan 1964*	Caernarvonshire	Conway Bay	34 W	x
	AT88511	26 Jun 1963	8 Feb 1964	Caernarvonshire	Conway Bay	20 W	x
	AT88553	26 Jun 1963	c. 25 Jan 1964	Glamorgan	Swansea Bay	120 S	x
	AT88556	26 Jun 1963	17 Mar 1966	Dumfriesshire	Solway Firth	110 N	x
	AT88633	26 Jun 1963	5 Oct 1966	Caernarvonshire	Conway Bay	30 W	v
	AT88606	26 Jun 1963	7 Feb 1967	Lancashire	Morecambe Bay	50 NNE	+

APPENDIX VI

Table 36 The number of Oystercatchers colour-banded in each study area which would be eligible for analysis in later years, assuming the likely mean annual mortality rate of 25 per cent

Study area	Season of colour-banding		Estimated number of colour-banded birds surviving to the following observation season				
			1962–63	1963–64	1964–65	1965–66	1966–67
Dee Estuary	1962–63	a	1 044	783	587	440	330
	1963–64	b	–	890	668	501	376
	1964–65	c	–	–	327	245	184
	Total eligible for analysis in each observation season		–	783 a	1 255 a+b	1 186 a+b+c	890 a+b+c
Morecambe Bay	1962–63	a	136	102	77	58	44
	1963–64	b	–	512	384	288	216
	1964–65	c	–	–	226	170	128
	Total eligible for analysis in each observation season		–	102 a	461 a+b	516 a+b+c	388 a+b+c
Conway Bay	1964–65		–	–	277	208	156
	Total eligible for analysis in each observation season		–	–	–	208	156
Burry Inlet	1963–64	a	–	240	180	135	101
	1964–65	b	–	–	52	39	29
	Total eligible for analysis in each observation season		–	–	180 a	174 a+b	130 a+b
Exe Estuary	1962–63	a	42	32	24	18	14
	1963–64	b	–	52	39	29	22
	Total eligible for analysis in each observation season		–	32 a	63 a+b	47 a+b	36 a+b

Notes
1. No allowance can be made for annual or local variations in mortality which may have occurred during the study period.
2. Birds are not eligible for analysis until the first observation season following the season of colour-banding.
3. Calculations are taken from the mid-point of the season of colour-banding to the mid-point of successive observation seasons (approximately 1 December).

APPENDIX VII

TABLES 37–45

THE ORIGINS AND ABUNDANCE OF THE COLOUR-BANDED OYSTERCATCHERS SEEN IN THE STUDY AREAS

In this Appendix, observational data and derived estimates are tabulated chronologically for each of the five study areas where wintering and passage Oystercatchers were colour-banded (i.e. *Morecambe Bay*, *Dee Estuary*, *Conway Bay*, *Burry Inlet* and *Exe Estuary*), and for three intermediate localities where observations were made more or less regularly, namely Colwyn Bay and Anglesey in North Wales, and the Three Rivers Estuary in South Wales.

Explanatory notes:

Date:
Except when stated otherwise, data are grouped by months within each season (August through March) of observation. This is mainly because in many areas the observations were scattered through the month.

P: mean population size:
The estimated monthly mean population level in an area is derived from counts made at irregular intervals during the month. In *Burry Inlet*, Three Rivers Estuary and *Exe Estuary*, populations were recorded on the stated day of observation. The *Morecambe Bay* population can be given only within broad limits because censusing this very large and widely dispersed population was too often incomplete.

Sample number of birds examined:
The aggregate of all birds examined in the month. Where observations were repeated, especially over several days, the cumulative sample size may exceed the actual population level listed in column 2.

F: frequency:
The observed proportion of colour-banded birds of stated origin in the monthly sample; expressed as the mean number of marked birds in each 1 000 birds examined.

N: estimated number present, calculated as $F \times P$:
Not a precise value but an estimated monthly mean level of abundance. It is based on two assumptions: (i) that colour-banded birds were mixed randomly in the area population at times of observation, or (ii) that those birds examined themselves represented random samples of the population in the area. There is no way of testing the validity of either assumption.

M: N as % of number marked to date:
Figures in italics quote the maximum numbers of marked birds which could be alive and eligible for analysis during a particular observation season. They are, thus, equivalent to the total numbers banded in seasons preceding a given observation season, and so ignore losses through mortality and colour-band failure. An allowance for mortality is made in the next column; colour-band failure rate was very low ($< 5\%$ total losses overall) during the study period (see Table 25) and, therefore, can be considered negligible for present purposes.

S: N as % of estimated number surviving to date:
Here, figures in italics give the estimated numbers of eligible banded birds which should still have been alive at the mid-point of an observation season, assuming a (likely) mean mortality rate of 25% per annum (see Appendix VI). No allowance can be made for probable annual or area variations in mortality experienced during the study.

Table 37 The origins and numerical abundance of colour-banded Oystercatchers seen in *Morecambe Bay*, 1964–

Date	Mean population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in *Morecambe Bay*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimated number surviving to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
Sep 1964	12 000–15 000	2 910	29.6	355–444	54.8–68.5	77.0– 96
Dec 1964	10 000–15 000	1 944	3.6	36– 54	5.6– 8.3	7.8– 11
Jan 1965	10 000–15 000	4 507	7.1	71–107	11.0–16.5	15.4– 23
Feb 1965	10 000–15 000	1 257	12.7	127–191	19.6–29.5	27.5– 41
Mar 1965	5 000–11 000	4 048	9.6	48–106	7.4–16.4	10.4– 23
1965–66					*874*	*516*
Sep 1965	38 000–42 000	4 019	11.4	433–479	49.5–54.8	83.9– 92
Oct 1965	15 000–25 000	1 079	8.3	125–208	14.3–23.8	24.2– 40
Dec 1965	15 000–20 000	3 699	7.8	117–156	13.4–17.8	22.7– 30
Jan 1966	10 000–15 000	2 446	9.0	90–135	10.3–15.4	17.4– 26
Mar 1966	5 000–10 000	1 529	3.3	17– 33	2.0– 3.8	3.3– 6
1966–67					*874*	*388*
Aug 5 1966	5 000–10 000	680	17.6	88–176	10.1–20.1	22.7– 45
Aug 14 1966	10 000–15 000	884	14.7	147–221	16.8–25.3	37.9– 57
Aug 29 1966	15 000–30 000	2 682	16.4	246–492	28.1–56.3	63.4–126
Oct 1966	15 000–30 000	1 328	12.8	192–384	22.0–43.9	49.5– 99
Nov 1966	10 000–20 000	1 505	1.3	13– 26	1.5– 3.0	3.4– 6
Dec 1966	10 000–20 000	1 323	5.3	53–106	6.1–12.1	13.7– 27

ins and abundance of colour-banded birds seen in *Morecambe Bay*
ntinued

Estuary				*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
		N as % of				N as % of				N as % of				N as % of	
	N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
		1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
	54– 68	2.8– 3.5	4.3– 5.4					0	0	0	0	0	0	0	0
	41– 62	2.1– 3.2	3.3– 4.9					0	0	0	0	0	0	0	0
5	36– 54	1.9– 2.8	2.9– 4.3					0	0	0	0	0	0	0	0
0	40– 60	2.1– 3.1	3.2– 4.8					0	0	0	0	0	0	0	0
0	30– 65	1.6– 3.4	2.4– 5.2					0	0	0	0	0	0	0	0
		2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
2	236–260	10.4–11.5	19.9–21.9	0	0	0	0	0	0	0	0	0	0	0	0
	167–278	7.4–12.3	14.1–23.4	0.9	13–23	4.7–8.3	6.3–11.1	0	0	0	0	0	0	0	0
5	143–181	6.3– 8.0	12.1–15.3	0.3	4– 6	1.4–2.2	1.9– 2.9	0	0	0	0	0	0	0	0
0	20– 30	0.9– 1.3	1.7– 2.5	0	0	0	0	0	0	0	0	0	0	0	0
5	13– 26	0.6– 1.2	1.1– 2.2	0	0	0	0	0	0	0	0	0	0	0	0
		2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
9	15– 29	0.7– 1.3	1.7– 3.3	0	0	0	0	0	0	0	0	0	0	0	0
7	57– 86	2.5– 3.8	6.4– 9.7	0	0	0	0	1.1	11–17	3.8–5.8	8.5–13.1	0	0	0	0
4	156–312	6.9–13.8	17.5–35.1	0	0	0	0	0.4	6–12	2.1–4.1	4.6– 9.2	0	0	0	0
5	68–135	3.0– 6.0	7.6–15.2	0	0	0	0	0	0	0	0	0	0	0	0
3	13– 26	0.6– 1.2	1.5– 2.9	0	0	0	0	0	0	0	0	0	0	0	0
8	38– 76	1.7– 3.4	4.3– 8.5	0	0	0	0	0	0	0	0	0	0	0	0

Table 38 The origins and numerical abundance of colour-banded Oystercatchers seen in the *Dee Estuary*, 1964–6

Date	Mean population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in *Dee Estuary*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimated number surviving to date
	P		F	N = F × P	M	S
1964–65					*648*	*461*
Dec 1964	3 000	6 464	0.2	1	0.2	0.2
Jan 1965	2 500	2 215	0	0	0	0
Feb 1965	1 500	4 795	0.4	1	0.2	0.2
Mar 1965	1 100	2 152	0	0	0	0
1965–66					*874*	*516*
Aug 1965	4 500	5 439	0	0	0	0
Sep 1965	5 000	7 866	0	0	0	0
Oct 1965	6 600	6 664	0.3	2	0.2	0.4
Nov 1965	2 200	2 713	0	0	0	0
Dec 1965	3 600	4 788	0.2	1	0.1	0.2
Jan 1966	2 400	2 348	0	0	0	0
Feb 1966	< 2 000	1 516	0	0	0	0
Mar 1966	< 1 000	246	4.1	< 4	< 0.5	< 0.8
1966–67					*874*	*388*
Dec 1966 / Jan 1967	6 500	4 240	0	0	0	0

gins and abundance of colour-banded birds seen in the *Dee Estuary*
ntinued

Estuary				*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
		N as % of				N as % of				N as % of				N as % of	
	N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
		1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
	66	3.4	5.3					0	0	0	0	0	0	0	0
3	51	2.6	4.1					0	0	0	0	0	0	0	0
	26	1.3	2.1					0	0	0	0	0	0	0	0
7	20	1.0	1.6					0	0	0	0	0	0	0	0
		2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
7	75	3.3	6.3	0	0	0	0	0	0	0	0	0	0	0	0
2	96	4.2	8.1	0.4	2	0.7	1.0	0	0	0	0	0	0	0	0
3	124	5.5	10.5	0.5	3	1.1	1.4	0	0	0	0	0	0	0	0
9	44	1.9	3.7	0	0	0	0	0	0	0	0	0	0	0	0
4	70	3.6	5.9	0	0	0	0	0	0	0	0	0	0	0	0
3	54	2.8	4.6	0	0	0	0	0	0	0	0	0	0	0	0
3	<30	<1.6	<2.5	0	0	0	0	0	0	0	0	0	0	0	0
3	<20	<1.0	<1.7	0	0	0	0	0	0	0	0	0	0	0	0
		2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
9	90	4.0	10.1	0	0	0	0	0	0	0	0	0	0	0	0

Table 39 The origins and numerical abundance of colour-banded Oystercatchers seen in *Colwyn Bay*, 1964–67

Date	Mean population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in *Colwyn Bay*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimated number surviving to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
Nov 1964	450	459	0	0	0	0
Jan 1965	650	616	0	0	0	0
Feb 1965	850	677	0	0	0	0
Mar 1965	450	668	0	0	0	0
1965–66					*874*	*516*
Feb 1966	550	373	0	0	0	0
1966–67					*874*	*388*
Oct 1966	350	529	0	0	0	0
Dec 1966	450	311	0	0	0	0
Jan 1967	450	333	0	0	0	0
Feb 1967	350	546	0	0	0	0
Mar 1967	200	125	0	0	0	0

ns and abundance of colour-banded birds seen in *Colwyn Bay*
tinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of				N as % of				N as % of				N as % of	
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
0	0	0					0	0	0	0	0	0	0	0
7	0.4	0.6					0	0	0	0	0	0	0	0
11	0.6	0.9					0	0	0	0	0	0	0	0
6	0.3	0.5					0	0	0	0	0	0	0	0
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
12	0.5	1.0	0	0	0	0	0	0	0	0	0	0	0	0
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
5	0.2	0.6	0	0	0	0	0	0	0	0	0	0	0	0
6	0.3	0.7	0	0	0	0	0	0	0	0	0	0	0	0
5	0.2	0.6	0	0	0	0	0	0	0	0	0	0	0	0
3	0.1	0.3	0	0	0	0	0	0	0	0	0	0	0	0
3	0.1	0.3	0	0	0	0	0	0	0	0	0	0	0	0

Table 40 The origins and numerical abundance of colour-banded Oystercatchers seen in *Conway Bay* (*Lavan Sa sub-area*), 1964–67

Date	Mean population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in *Conway Bay: (1) Lavan Sands sub-area*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimat number survivin to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
Aug 1964	2 500	4 692	0	0	0	0
Sep 1964	2 500	1 177	0	0	0	0
Oct 1964	2 250	1 461	0.7	2	0.3	0.4
Nov 1964	2 250	1 845	0	0	0	0
Jan 1965	1 750	501	0	0	0	0
Feb 1965	1 500	1 135	1.8	3	0.4	0.7
Mar 1965	1 500	1 550	0.6	1	0.2	0.2
1965–66					*874*	*516*
Jul 1965	1 200	1 415	0	0	0	0
Aug 1965	2 750	5 095	0.4	1	0.1	0.2
Sep 1965	2 500	3 053	0	0	0	0
Oct 1965	2 000	2 613	0.4	1	0.1	0.2
Nov 1965	2 250	1 548	0.6	1	0.1	0.2
Feb 1966	1 750	1 371	0.7	1	0.1	0.2
Mar 1966	1 250	998	0	0	0	0
1966–67					*874*	*388*
Jul 1966	600	449	0	0	0	0
Aug 1966	1 500	886	0	0	0	0
Sep 1966	2 500	3 016	1.0	3	0.3	0.8
Oct 1966	2 500	636	0	0	0	0
Nov 1966	2 500	794	0	0	0	0
Jan 1967	1 750	1 457	0	0	0	0
Feb 1967	1 750	2 267	0	0	0	0
Mar 1967	1 500	1 838	1.1	2	0.2	0.5

ns and abundance of colour-banded birds seen in *Conway Bay: (1) Lavan Sands sub-area*
tinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of				N as % of				N as % of				N as % of	
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
10	0.5	0.8					0	0	0	0	0	0	0	0
2	0.1	0.2					0	0	0	0	0	0	0	0
8	0.4	0.6					0	0	0	0	0	0	0	0
11	0.6	0.9					0	0	0	0	0	0	0	0
14	0.7	1.1					0	0	0	0	0	0	0	0
8	0.4	0.6					0	0	0	0	0	0	0	0
15	0.8	1.2					0	0	0	0	0	0	0	0
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
2	0.1	0.2	27.6	33	11.9	15.9	0	0	0	0	0	0	0	0
11	0.5	0.9	34.7	95	34.3	45.7	0	0	0	0	0	0	0	0
5	0.2	0.4	44.5	111	40.1	53.4	0	0	0	0	0	0	0	0
8	0.4	0.7	45.9	92	33.2	44.2	0	0	0	0	0	0	0	0
12	0.6	1.0	38.1	86	31.0	41.3	0	0	0	0	0	0	0	0
14	0.7	1.2	37.9	66	23.8	31.7	0	0	0	0	0	0	0	0
21	1.1	1.8	22.0	28	10.1	13.5	0	0	0	0	0	0	0	0
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
0	0	0	22.3	13	4.7	8.3	0	0	0	0	0	0	0	0
2	0.1	0.2	30.5	46	16.6	29.5	0	0	0	0	0	0	0	0
9	0.4	1.0	25.9	65	23.5	41.7	0	0	0	0	0	0	0	0
0	0	0	29.9	75	27.1	48.1	0	0	0	0	0	0	0	0
3	0.1	0.3	36.5	91	32.9	58.3	0	0	0	0	0	0	0	0
10	0.4	1.1	26.1	46	16.6	29.5	0	0	0	0	0	0	0	0
6	0.3	0.7	16.3	29	10.5	18.6	0	0	0	0	0	0	0	0
4	0.2	0.4	16.9	25	9.0	16.0	0	0	0	0	0	0	0	0

Table 41 The origins and numerical abundance of colour-banded Oystercatchers seen in *Conway Bay* (*Conway sc sub-area*), 1964–67

Date	Mean population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in *Conway Bay: (2) Conway scars sub-area*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimat number survivi to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
Oct 1964	1 500	503	0	0	0	0
Nov 1964	1 500	617	0	0	0	0
Jan 1965	1 500	565	0	0	0	0
Feb 1965	1 500	1 020	0	0	0	0
Mar 1965	1 000	1 348	0	0	0	0
1965–66					*874*	*516*
Jul 1965	1 000	405	0	0	0	0
Aug 1965	1 500	2 037	0	0	0	0
Sep 1965	2 000	1 388	0	0	0	0
Oct 1965	1 500	1 671	0	0	0	0
Nov 1965	1 500	1 071	0	0	0	0
Jan 1966	1 000	872	0	0	0	0
Mar 1966	1 000	1 000	0	0	0	0
1966–67					*874*	*388*
Aug 1966	1 250	2 102	0	0	0	0
Sep 1966	1 500	1 478	0	0	0	0
Oct 1966	1 500	1 561	0	0	0	0
Nov 1966	1 500	401	0	0	0	0
Dec 1966	1 750	502	0	0	0	0
Jan 1967	1 500	648	0	0	0	0
Feb 1967	1 500	735	0	0	0	0
Mar 1967	750	1 347	0	0	0	0

ns and abundance of colour-banded birds seen in *Conway Bay: (2) Conway scars sub-area*
tinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of			N as % of				N as % of				N as % of		
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
0	0	0					0	0	0	0	0	0	0	0
0	0	0					0	0	0	0	0	0	0	0
13	0.7	1.0					0	0	0	0	0	0	0	0
10	0.5	0.8					0	0	0	0	0	0	0	0
2	0.1	0.2					0	0	0	0	0	0	0	0
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
10	0.4	0.8	0	0	0	0	0	0	0	0	0	0	0	0
6	0.3	0.5	4.9	7	2.5	3.4	0	0	0	0	0	0	0	0
1	<0.1	<0.1	2.9	6	2.2	2.9	0	0	0	0	0	0	0	0
12	0.5	1.0	1.2	2	0.7	1.0	0	0	0	0	0	0	0	0
10	0.4	0.8	2.8	4	1.4	1.9	0	0	0	0	0	0	0	0
7	0.3	0.6	3.4	3	1.1	1.4	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
4	0.2	0.4	1.4	2	0.7	1.3	0	0	0	0	0	0	0	0
7	0.3	0.8	3.4	5	1.8	3.2	0	0	0	0	0	0	0	0
7	0.3	0.8	1.3	2	0.7	1.3	0	0	0	0	0	0	0	0
8	0.4	0.9	0	0	0	0	0	0	0	0	0	0	0	0
7	0.3	0.8	6.0	11	4.0	7.1	0	0	0	0	0	0	0	0
2	0.1	0.2	0	0	0	0	0	0	0	0	0	0	0	0
4	0.2	0.4	0	0	0	0	0	0	0	0	0	0	0	0
2	0.1	0.2	1.5	1	0.4	0.6	0	0	0	0	0	0	0	0

Table 42 The origins and numerical abundance of colour-banded Oystercatchers seen on *Anglesey*, 1964–67

Date	Mean population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen on *Anglesey*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimated number surviving to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
Sep 1964	1 500	1 120	0.9	1	0.2	0.2
Jan 1965	10 000 *influx*	2 164	0.5	5	0.8	1.1
1965–66					*874*	*516*
Aug 1965	1 000	320	0	0	0	0
Sep 1965	1 500	375	0	0	0	0
Oct 1965	1 500	620	1.6	2	0.2	0.4
Nov 1965	1 500	570	1.8	3	0.3	0.6
Dec 1965	1 500	351	2.8	4	0.5	0.8
Jan 1966	1 500	215	0	0	0	0
1966–67					*874*	*388*
Sep 1966	1 500	795	0	0	0	0
Nov 1966	1 750	1 141	0.9	2	0.2	0.5
Dec 1966	1 000	1 118	0	0	0	0
Jan 1967	1 250	1 464	0	0	0	0
Feb 1967	500	270	0	0	0	0
Mar 1967	500	334	0	0	0	0

ns and abundance of colour-banded birds seen on *Anglesey*
tinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of				N as % of				N as % of				N as % of	
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*34*
11	0.6	0.9					0	0	0	0	0	0	0	0
60	3.1	4.8					1.4	14	5.8	7.8	0	0	0	0
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0.4	0.7	2.7	4	1.4	1.9	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1.6	2	0.7	1.1	0	0	0	0
11	0.5	0.9	1.8	3	1.1	1.4	0	0	0	0	0	0	0	0
13	0.6	1.1	2.8	4	1.4	1.9	5.7	9	3.1	5.2	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.1	0.2	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 43 The origins and numerical abundance of colour-banded Oystercatchers seen in *Burry Inlet*, 1964–67

Date	Population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in *Burry Inlet*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimated number surviving to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
19 Dec 1964	11 500	2 347	0	0	0	0
2 Jan 1965	11 500	2 303	0	0	0	0
18 Feb 1965	9 500	2 548	0	0	0	0
18 Mar 1965	5 000	1 457	0	0	0	0
1965–66					*874*	*516*
9 Sep 1965	10 500	1 428	0	0	0	0
5 Oct 1965	10 000	725	0	0	0	0
15 Nov 1965	17 000	958	0	0	0	0
20 Jan 1966	12 500	2 408	0	0	0	0
16 Feb 1966	8 000	2 279	0	0	0	0
17 Mar 1966	2 000	904	0	0	0	0
1966–67					*874*	*388*
16 Sep 1966	8 000	2 488	0	0	0	0
15 Oct 1966	9 500	1 870	0	0	0	0
24 Nov 1966	16 500	2 156	0.5	8	0.9	2.1
15 Dec 1966	11 500	3 238	0	0	0	0
26 Jan 1967	11 000	1 140	0	0	0	0

ns and abundance of colour-banded birds seen in *Burry Inlet*
ntinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of				N as % of				N as % of				N as % of	
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
0	0	0					11.9	137	57.1	76.1	0	0	0	0
5	0.3	0.4					9.6	110	45.8	61.1	0	0	0	0
0	0	0					14.1	134	55.8	74.4	0	0	0	0
4	0.2	0.3					14.4	72	30.0	40.0	0	0	0	0
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
0	0	0	0	0	0	0	18.2	191	65.4	109.8	0	0	0	0
0	0	0	0	0	0	0	13.8	138	47.3	79.3	0	0	0	0
36	1.6	3.0	0	0	0	0	8.4	143	49.0	82.2	0	0	0	0
15	0.7	1.3	0.4	5	1.8	2.4	7.5	94	32.2	54.0	0	0	0	0
7	0.3	0.6	0	0	0	0	4.4	35	12.0	20.1	0	0	0	0
2	0.1	0.2	0	0	0	0	2.2	4	1.4	2.3	0	0	0	0
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
0	0	0	0.4	3	1.1	1.9	6.8	54	18.5	41.5	0	0	0	0
15	0.7	1.7	0	0	0	0	9.6	91	31.2	70.0	0	0	0	0
76	3.4	8.5	0.9	15	5.4	9.6	8.3	137	46.9	105.4	0	0	0	0
3	0.1	0.3	0.3	3	1.1	1.9	3.4	39	13.4	30.0	0	0	0	0
10	0.4	1.1	0.9	10	3.6	6.4	7.0	77	26.4	59.2	0	0	0	0

Table 44 The origins and numerical abundance of colour-banded Oystercatchers in the *Three Rivers Estua* 1964–67

Date	Population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in the *Three Rivers Estuary*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimate number surviving to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
3 Jan 1965	3 500	745	0	0	0	0
1965–66					*874*	*516*
17 Feb 1966	4 000	1 649	0	0	0	0
1966–67					*874*	*388*
14 Oct 1966	6 000	615	0	0	0	0
24 Nov 1966	3 000	1 085	0	0	0	0
15 Dec 1966	3 000	588	0	0	0	0
12 Jan 1967	2 500	851	0	0	0	0
28 Feb 1967	750	420	0	0	0	0

ins and abundance of colour-banded birds seen in the *Three Rivers Estuary*
ntinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of				N as % of				N as % of				N as % of	
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
14	0.7	1.1					1.3	5	2.1	2.8	0	0	0	0
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
7	0.3	0.6	0.6	2	0.7	1.0	3.0	12	4.1	6.9	0	0	0	0
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
10	0.4	1.1	0	0	0	0	4.9	29	9.9	22.3	0	0	0	0
5	0.2	0.6	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3.4	10	3.4	7.7	0	0	0	0
0	0	0	0	0	0	0	4.7	12	4.1	9.2	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 45 The origins and numerical abundance of colour-banded Oystercatchers seen in the *Exe Estuary*, 1964

Date	Population size	Sample number of birds examined	Origins and abundance of colour-banded birds seen in the *Exe Estuary*			
			Morecambe Bay			
			Frequency ‰	Estimated number present	N as % of	
					Number marked to date	Estimated number surviving to date
	P		F	N=F×P	M	S
1964–65					*648*	*461*
21 Dec 1964	2 000	402	0	0	0	0
26 Feb 1965	1 500	74	0	0	0	0
1965–66					*874*	*516*
17 Oct 1965	1 750	1 766	0	0	0	0
1966–67					*874*	*388*
16 Oct 1966	2 000	236	0	0	0	0
15 Jan 1967	1 500	583	0	0	0	0

ins and abundance of colour-banded birds seen in the *Exe Estuary*
ntinued

Estuary			*Conway Bay*				*Burry Inlet*				*Exe Estuary*			
	N as % of				N as % of				N as % of				N as % of	
N	M	S	F	N	M	S	F	N	M	S	F	N	M	S
	1 934	*1 255*			*0*				*240*	*180*			*94*	*63*
5	0.3	0.4					0	0	0	0	42.3	85	90.4	134.9
0	0	0					0	0	0	0	27.0	41	43.6	65.1
	2 261	*1 186*			*277*	*208*			*292*	*174*			*94*	*47*
0	0	0	0	0	0	0	0	0	0	0	23.8	42	44.7	89.4
	2 261	*890*			*277*	*156*			*292*	*130*			*94*	*36*
0	0	0	0	0	0	0	0	0	0	0	8.5	17	18.1	47.2
5	0.2	0.6	0	0	0	0	0	0	0	0	30.1	45	47.9	125.0

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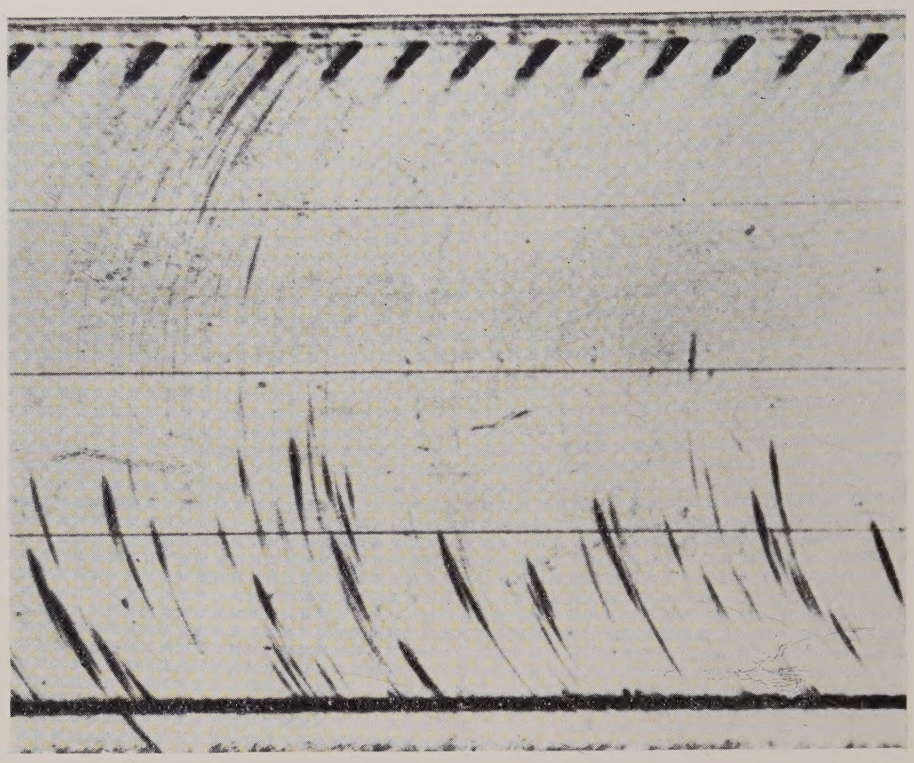

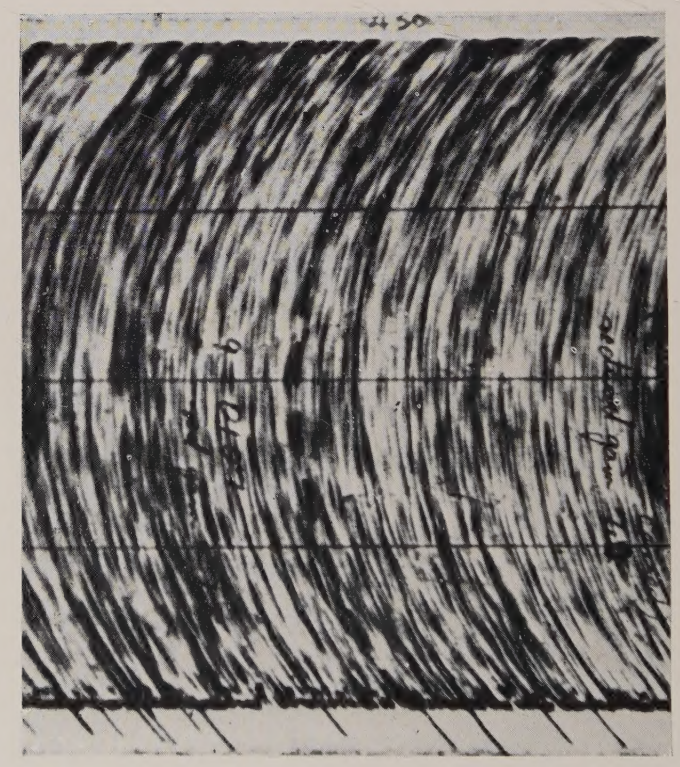

Charts of single fish from the Triggered Pen Recorder.
Top: scattered hyperbolic traces. *Bottom*: dense 'blob' traces.